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Blood Transfusion in Veterinary Practice*

BY

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SUMMARY.—Blood transfusion is a potentially dangerous operation and should only be performed when it is indicated.

In general, in most animal species, a single transfusion of blood without regard to cross-matching is safe provided the recipient has never before had a transfusion. Repeated transfusions are potentially dangerous without cross-matching.

The infusion of saline is not usually indicated since it is excreted very rapidly. It is, however, useful in cases of continued emesis.

The use of plasma volume expanders, such as the dextrans, may be useful in certain species where cases of haemoconcentration have occurred.

There is no equivalent of the human ABO blood group system in animals and there is no useful test for incompatibility which can be employed unless laboratory facilities are available.

THE transfusion of blood is often a life-saving measure in any species, but it is also a hazardous operation carrying potentially serious risks. While this should not deter the use of transfusion when it is indicated in practice, the operation should only be undertaken with great care.

Indications for Blood Transfusion

A number of circumstances in which blood transfusion is indicated will come immediately to mind. Perhaps the most obvious is blood loss caused by accidental trauma or by prolonged and major surgical interference. It is necessary to distinguish at this point between surgical shock and whole blood loss, since shock is best treated by methods other than whole blood transfusion. This will be discussed later. Transfusion with whole blood is also indicated as a generally supportive measure in specific diseases, such as haemophilia, which cause spontaneous haemorrhage. In these circumstances, blood transfusion is particularly useful since specific failure of the blood to clot may be caused either by a deficiency of a coagulation factor or factors (as in haemophilia) or by the presence of an anticoagulant (as in warfarin poisoning). In either type of case, infusion of whole blood will be beneficial since it will partially restore coagulation factors, or dilute the anticoagulant, besides replacing the erythrocytes and plasma which have been lost through haemorrhage.

A further indication for transfusion of blood occurs in cases of haemolytic disease of the newborn. Since there is always a profound anaemia with this disease, it is an urgent matter to provide erythrocytes for gaseous exchange, but it is also urgent to remove or dilute the circulating antibody which is causing destruction of red blood cells and accumulation of bilirubin. For this reason, haemolytic disease is treated by exchange transfusion and in the newborn foal we would infuse from 2 to 4 litres of whole, compatible donor blood in 20-ml. amounts, removing 20 ml. amounts of foal blood to waste between each injection.

There remain indications for transfusion with material other than whole blood. In this connexion consideration is given to blood plasma infusion, glucose saline and the so-called "plasma-expanders" such as dextran. It is certainly preferable that an increase in circulating plasma volume be provided in conditions such as surgical shock without frank haemorrhage, severe burns and haemoconcentration as may be caused by kidney disease leading to excessive fluid loss *via* the urine. Similarly in acute or persistent diarrhoea fluid loss occurs and may be serious unless replacement of fluid takes place. Grass sickness cases in horses may also exhibit marked haemoconcentration. Ideally, haemoconcentration should be treated with infusions of fresh, compatible plasma. Preserved plasma, whether frozen at −20° C. or colder, or freeze-dried, is not generally available, although at the Equine Research Station we do have a small stock of whole frozen horse plasma available. Glucose-saline is not a satisfactory substitute since it is so rapidly excreted that no

* Paper presented to the Central Veterinary Society on November 3rd, 1960.

appreciable or continued degree of plasma volume expansion can be maintained by this means. There is, however, at least one strong indication for saline infusion and that is in cases of continued and prolonged emesis in which chloride loss is appreciable.

The question of dextran infusion is fraught with difficulty. This treatment has had a considerable vogue in human clinical practice, but its use now appears to be declining, since natural products have become much more freely available. The problem is that in some individuals of some species some dextrans are potent histamine-release agents and there is therefore a risk of severe reaction when they are used. So far as we are aware, there have been no reports of severe reaction to dextran in the dog, but we have had 2 such cases in horses. Dextran might be likened to morphine in this respect since morphine may produce disastrous histamine release in some species and individuals (for example, in almost all cats) while being entirely innocuous in this respect for the great majority. Dextran is also an efficient anticoagulant causing interference with the thrombin-fibrinogen reaction. The use of large volumes of this material may therefore cause a haemorrhagic crisis. Dextran is not rapidly excreted and it is theoretically a most useful agent for expansion of plasma volume, but its use in the horse is not recommended. There are several different dextrans available for transfusion, and it may be that some of the latest are relatively free of danger.

It should be noted that transfusion of whole blood is contraindicated where haemoconcentration exists and that plasma or plasma volume expanders are contraindicated in anaemias. A general summing up of the indications for transfusion of whole blood would be those conditions in which there has been a loss of whole blood. Indications for plasma or plasma substitutes arise when there has been a loss of circulating fluid but not of the blood cells.

Collection and Preservation of Blood for Transfusion

Blood is a fragile suspension of living cells in a most complex fluid medium, the plasma. Collected blood is very readily subject to trauma, to infection and to metabolic decay when removed from the body. Ideally, blood should be transfused directly from a donor to the recipient without any delay or the use of an anticoagulant. This method is never practicable for many reasons, perhaps the most important being the extreme difficulty of controlling the rate of flow and of preventing resurgence from recipient to donor, or the complete prevention of extravascular coagulation. It is therefore necessary to use bottles for storage, with a suitable anticoagulant.

For the larger animals, the use of blood bottles provided by the Blood Transfusion Service is entirely satisfactory. The standard anticoagulant, acid citrate dextrose (A.C.D.) which is used, preserves the blood of most animals as well as it preserves human blood. A large needle of 3 mm. diameter should be inserted carefully and precisely into the lumen of a jugular vein of the donor through a wheal of local anaesthetic. A free flow of blood is essential and this should impinge upon the side of the collecting bottle containing anticoagulant so as to minimise frothing. It is essential to agitate the bottle occasionally during collection of blood to ensure proper admixture with the anticoagulant.

A most satisfactory alternative to the bottles provided by the Blood Transfusion Service are the plastic sets manufactured by Fenwall Laboratories in the U.S.A. and marketed in this country by Baxter Laboratories Ltd. These sets are disposable and can be transported for considerable periods of time in a car while remaining sterile and virtually unbreakable.

Blood once collected should always be infused as soon as possible, but if storage for more than half an hour or so is unavoidable it is preferable to refrigerate the material at between 4° and 6° C. It is, of course, essential not to freeze the blood since this would lead to complete cellular disintegration and the material would be worse than useless—it would be harmful.

Blood which has been preserved for more than 10 days should never be transfused, and it must be remembered that the longer blood is stored, the shorter time will its cells survive intact in the recipient. In the National Blood Transfusion Service, human blood is considered to be unsuitable for transfusion 21 days after the blood is drawn, but a very large proportion of blood is transfused within 7 days. There is little information relating to the effect of storage on survival of transfused red blood cells in animals other than man, and it would be advisable to err on the safe side, and restrict transfusions to fresh blood, or blood stored for less than ten days at 4° C. Blood for transfusion is sometimes contaminated with bacteria which can grow at 4° C. and such infected bottles have caused death in man; it should be realised that storage increases the risk of transfusing grossly contaminated blood.

There are a great many specialised techniques for the collection of blood with a view to special preservation of one or another of its many constituents, but these are outside the scope of a general review. Mention may be made of the use of other anticoagulants, such as sequestrene which is especially valuable for the preservation of blood platelets although this is not a suitable anticoagulant for routine transfusions, or of siliconed glass surfaces to minimise trauma and the loss of some of the blood coagulation factors.

The Operation of Blood Transfusion

Blood must be transfused through a needle of at least 1 mm. internal diameter or through a polythene catheter. It is wise to give a small amount and then arrest the transfusion for about 2 minutes in order to be sure that no untoward reaction occurs. In the larger animals, no more than one litre of blood should be given in a 10-minute period and within practicable limits the slower the infusion the better to enable the heart and vascular system to accommodate the increased volume without embarrassment.

Drip infusions are difficult to maintain in the larger animals at the present time unless they are recumbent or in a fully equipped hospital.

Failure of Blood Transfusions

Blood transfusions sometimes fail to produce a beneficial clinical response or, worse, they may cause a deterioration. There may be several reasons for this. One such is the use of an excessive amount of anticoagulant in the donor blood, so that the recipient is deprived of calcium, and bleeding ensues. If there is doubt about this point it is always worthwhile to give some calcium as calcium gluconate by intramuscular or slow intravenous injection. An excess of calcium will not produce spontaneous intravascular clotting so that risk of overdose is not a problem. However, the chief reason for blood transfusion failures is the use of incompatible blood. Transfusion of incompatible blood may produce a harmful transfusion reaction, or at the best, the transfused cells will be rapidly removed from the recipient's circulation.

Transfusion Reactions

A transfusion reaction may be easily recognised in the conscious animal. In the horse the first sign often is flexing of each of the hind limbs in turn, and increase in the respiration rate accompanied by flaring of the nostrils. The animal often holds its head down, sometimes its breathing becomes noisy, and it may "yawn" several times. Breathing becomes more shallow and in severe reactions the animal tends to hold its breath in the inspired position. Defaecation and micturition will occur in severe reactions, and the horse may fall over.

In most species the most constant and reliable symptoms seem to be increase in the respiration and heart rate, and defaecation. A mild reaction may take 5 to 10 minutes to develop, but there is considerable variation between species.

Blood Groups in Relation to Transfusion

Incompatibility of transfused blood which produces a transfusion reaction may occur because cells which possess certain specific chemical groups or "antigens" are injected into an animal whose cells lack these antigens. As a result, specific proteins, called antibodies, are produced, which react with the injected cells and lead to their removal from the circulation.

Almost all red cell antigens are genetically determined, and usually an animal does not have antigens which are absent from both of its parents, although there are interesting but rare exceptions to this.

A considerable amount is now known about the red cell antigens, or "blood groups" of a large number of vertebrate species, and there are many published reports dealing with immunological or genetical investigations of red cell antigens, and with the use of blood group studies in solving problems of paternity, or in progeny testing and milk yield investigations. These investigations of red cell antigens will not be considered here except as they relate to blood transfusions. The misleading term "blood group," a term which ought never to have been applied to any animal other than man, denotes that members of a species can be put into one or other of several groups according to the antigens present on their red cells. In man there is the classical ABO system.

The human ABO system is unique. In no other species is there anything analogous and in only a few species are naturally occurring iso-antibodies found. However, in all avian and mammalian species except the guinea-pig, injection of blood from one animal into another of the same species may lead to the appearance of potent "immune" antibodies. A second transfusion of the same blood would then result in a transfusion reaction. Since tissue cells and red cells have many antigens in common, the injection of tissue cells often leads to the appearance of high-titre antibodies against the red cells. Thus, in the United States, injection of Equine Virus Abortion vaccine into horses was found to stimulate the production of anti-red cell antibodies.

In some cattle a naturally occurring antibody, anti-J, occurs, yet transfusion of J-positive blood into a cow which has anti-J in its serum apparently does not produce a transfusion reaction. In sheep a similar naturally occurring antibody, anti-R, occurs, but, once again, transfusion of R-incompatible blood does not lead to clinical signs of incompatibility, although there is some evidence that R-incompatible blood in the sheep is more rapidly removed from the circulation than is compatible blood. It would, however, survive long enough to be of immediate use in the treatment of whole blood loss in surgery, but not for treatment of anaemia.

In the horse naturally occurring antibodies are very weak and very rare, and seem to have no effect on transfusion. On the other hand, injection of blood from one horse into another almost always stimulates the production of potent antibodies, so that a second transfusion of blood from the same or another animal of the same blood-type is almost always useless and would often be fatal. Similarly in the cow and the sheep, potent immune antibodies are produced as a result of transfusion, and this makes any second transfusion dangerous. Immune antibodies appear in most species between 3 and 10 days after injection of donor blood. Thus the general rule in any species, other than man, is: The first transfusion can be from any available animal, but a second transfusion will almost always be dangerous.

The danger of stimulating antibodies to red cells by the administration of vaccines containing tissue products has been mentioned. An example of this is the injection of crystal violet vaccine to immunise pigs against swine fever. When injected with this vaccine, which contains pig tissue or red cell material, a pig will respond by producing potent antibodies which will react with the red cells. Another example in which the biological mechanism is probably similar, is the iso-immunisation of pregnancy which results in haemolytic disease of the newborn. In the horse and in man, the only species in which we know with certainty that the disease occurs naturally,

it is supposed that some foetal material must pass into the mother and immunise her, and that the resulting antibodies pass into the foetus or newborn animal and destroy its red cells. In man the route by which the antibodies reach the foetal circulation is across the placenta; in the horse the route is through the first colostrum. Immunisation of sows with swine fever vaccine also causes haemolytic disease of the newborn piglet, particularly where the sow is an Essex or Wessex pig and the boar is a Large Black. Haemolytic disease of the newborn has been produced in the dog by injection of a bitch with the cells of the dog with which she has been mated: the resulting puppies almost always suffer from haemolytic disease. It is not certain whether haemolytic disease of the newborn dog can occur naturally as in man; there have been sporadic reports, but there are no proven cases.

In those species in which the antibody is transferred in the first colostrum, the development of the disease can be prevented by not allowing the newborn animal to suck. However, in all species, once the disease has developed, the treatment is by exchange transfusion, replacing the blood of the newborn animal with an equivalent amount of blood from a compatible donor.

Selection of a Blood Donor

The selection of a compatible donor for blood transfusion is technically difficult and there is no technique available which can be used in the field. With laboratory facilities it is fairly straightforward. In general there are two alternative cross-matching techniques used in the laboratory; which one is used depends on the species to be examined. By the first technique, which can be used for most mammalian species except cattle and sheep, washed red cells from the donor and serum or plasma from the recipient are mixed and after incubation at 37° C., the cells are again washed to remove excess serum which would otherwise inhibit the next stage of the reaction. The washed cells are then placed on a tile and mixed with a rabbit antiserum prepared against serum from the donor species (thus if the transfusion is in the horse, a rabbit antiserum against horse serum is used). If the prospective donor's cells have been sensitised by antibody from the recipient's blood, they will be agglutinated by the rabbit antiserum. This would indicate that the potential donor is incompatible.

The other method, which could be used for cattle and sheep, is somewhat simpler. Washed donor cells are mixed with the recipient's serum and guinea-pig or rabbit complement in a tube, and the tube is incubated in a water bath at 37° C. Incompatibility is indicated when lysis of the prospective donor's cells occurs.

Both of these tests require laboratory facilities and special reagents, and are therefore obviously of limited value. The only practical method for the veterinary surgeon to adopt is to give any infusion with care, pausing for some minutes after the first few ml. have been given to see if any untoward reaction occurs.

In general, the principles guiding the selection of a donor are:—

Use any donor at random for a first transfusion.

Avoid a second transfusion whenever possible.

Never transfuse a breeding female unless absolutely necessary.

Never transfuse a female with the blood of any male animal with which she may in future be mated.

Transfuse a young animal with the blood of its dam, unless there are indications of haemolytic disease of the newborn.

Practical Notes on Blood Transfusion in Different Species

It may be felt that all these facts must weigh heavily against the use of blood transfusion in the field. An attempt will therefore be made to summarise the position species by species.

Horses

One transfusion of blood chosen at random is, in general, safe. There need be no attempt to cross-match the blood of the donor, but enquiry should always be made as to whether or not the horse has ever had a blood transfusion before. Repeated transfusions of the same blood is safe if it is done within 24 hours of the first transfusion and so at intervals of no more than a day for about a week.

Transfusion of unmatched blood plasma is safe and may be repeated indefinitely in the horse, except where plasma is derived from an iso-immunised mare.

The use of dextran is not recommended since there have been cases of very severe reaction to this material in horses.

Cattle and Sheep

Single transfusions of unmatched whole blood are safe, regardless of the amount given. Cattle do apparently respond to the transfusion of incompatible blood by the production of clinically important antibodies. Antibody development again takes about a week and transfusion of whole blood from a single donor may be repeated 3 or 4 times at 24-hour intervals, but not thereafter. Transfusions of blood plasma have not, to our knowledge, been reported in cattle and sheep. Repeated infusions would presumably be dangerous because of the anti-J and anti-R systems of these species.

Pigs

Because of the prevalence of immunisation with swine fever vaccine, blood transfusion should not be attempted in the pig except as a last resort, unless laboratory facilities are available.

Dogs

Transfusions of blood in dogs are frequently done, but, once again, although one transfusion is safe, the dog will often produce immune antibodies which would make a second transfusion dangerous.

(*Concluded at foot of page* 661)

Corpus Luteum Enucleation in the Cow: Therapeutic and Traumatic Effects

BY

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SUMMARY.—Much of the recent literature indicates that corpus luteum enucleation in the cow is approximately 60 per cent. effective as a treatment for suboestrus, and perhaps equally so for true retention of the corpus luteum. Evidence on its value in treating repeat-breeder cases typically with regular cycles is inconclusive. The danger of excessive bleeding may have been much exaggerated; the possible risk from bursal adhesion has been heavily stressed. Enucleation was carried out in a series of 8 normal control cows and 44 discarded for failure to breed, including 24 in which the uterus appeared normal and 20 with endometritis, as differentiated by histopathology. Enucleation was done twice in 7 cows and once in 45. Ovulation was induced by 75 per cent. of the enucleations. Oestrus signs accompanied about half of these where the previous natural ovulation had been suboestrus, thus confirming previous work. The findings of Schütte were confirmed that only 33 per cent. of ovulations induced in endometritis cases were accompanied by well-expressed oestrus, as contrasted with 66 to 77 per cent. in cases with normal uterus. Evidence was obtained that enucleation as late as the 12th to 14th day after the previous ovulation was just as efficient as earlier enucleation in bringing about ovulation, so also was the partial enucleation of a crumbling corpus, but not mere crushing. Out of the total of 59 enucleations, the existing ovarian cycle remained unaffected by 7; in 4 to 6 cows enucleation was followed by cyclic stasis, lasting from a minimum figure of 6 days up to not less than 5 weeks. A further 4 enucleations had the effect of precipitating cystic ovarian disease in the cows, and in one animal this resisted treatment. On this evidence cyclic stasis and cystic disease are the chief hazards attending corpus luteum enucleation. Observations on the extent of haemorrhage supported the conclusions of Heckhausen, that bleeding was negligible when the previous ovulation had been silent, but relatively free when this had been accompanied by oestrus or when the uterus was occupied. In only 2 cases did enucleation result in the formation of such bursal adhesions as might just possibly have affected future breeding prospects. The service results at the induced heat are recorded for 14 cows.

Part I.—Assessment by Annotation

Introduction

THE simple operation of corpus luteum enucleation in the cow has probably been performed for centuries all over the world; in more recent times, Andres (1944) refers to it as having become already a familiar routine manipulation in Switzerland by 1875. From the clinician's point of view the proceeding certainly has great psychological

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Blood Transfusion in Veterinary Practice.—*Concluded.*

General Notes on Blood Transfusion Techniques

It is very important not to use too great a volume of blood and to avoid over-rapid infusion. Considerable embarrassment may be caused to the heart and delicately balanced circulating blood volume if this is not done. Further, it is important to assess renal function which may be severely depressed in cases of shock. Except in exchange transfusions, where the blood volume is maintained approximately constant, it is a general rule not to exceed 1 litre at a single transfusion in the larger species, or 100 c.c. in the dog. Some increase in these volumes may be permitted where severe haemorrhage has depleted the blood volume but it is essential that larger volumes be given slowly and certainly not in less than about half an hour.

It is virtually impossible in the field to collect blood with complete asepsis. Every effort must be made to approach this goal, however, since bacterial contamination might not only be hazardous to the recipient, it will certainly reduce the time for which transfused blood cells will survive.

An antibiotic "umbrella" is always advisable where blood transfusion is used. The antibiotics, however, should not be mixed with the material for transfusion but should be given by intramuscular or intravenous injection with separate, clean apparatus. It is inadvisable to use as a blood donor an animal which has had considerable antibiotic therapy, since antibodies to these materials may appear and may be most detrimental to a recipient.

It must also be remembered that blood transfusions are known to depress the rate of formation of new erythrocytes in the bone marrow so that repeated transfusions may produce hypoplasia of the bone marrow. The precise mechanism of this reaction is somewhat problematical, but on general physiological principles it can be appreciated that suppression of blood cell-forming organs would be expected when large numbers of additional cells are abruptly introduced into the circulation.

advantages. The very popularity of corpus enucleation led to the development of a widespread misconception that retention or persistence of the corpus luteum was a very common functional disorder of the bovine reproductive system. Latterly it has been more generally recognised that, although such a true retention can occur in the absence of other abnormalities (*e.g.* Hurst, 1959; Trimberger, 1956), this event is relatively rare and the great majority of cases so designated are in fact cases of suboestrus or silent heat, when the ovaries behave in a normal cyclic manner but no external signs of heat are shown. Even to the present time only a small minority of those who have investigated corpus luteum enucleation have been in a position to determine by serial examinations, previous to the interference, the status of their "anoestrous" cases in this respect. Additionally, the operation, involving the "resetting" of the oestrous cycle from the time of the heat induced within a few days by enucleation, has been recommended, for instance, by F. Nielsen (1926), as a treatment for animals returning to service when the cow's heats were already occurring regularly.

Enucleation in Symptomatic Anoestrus

Table I summarises the results of 11 experiments in enucleation, of which 6 were conducted on "anoestrous" and 3 on repeat-breeding (returning) material, while the type of material used in the remaining 2 was less clearly specified. Ten of these experiments provide data relative to the success of the procedure in heat induction. In 7, heat appeared within 7 to 9 days in 60 to 70 per cent. of subjects. The remaining 3 experiments, numbers 4, 7, and 10 showed better results, and here the rate was 77 to 90 per cent. There was no obvious common feature to account for the improvement, but Dowling (1949)

TABLE I
SEQUELAE OF CORPUS LUTEUM ENUCLEATION
Section I : Cases of "persistent corpus luteum" and suboestrus.
Section II : Cases of unspecified origin.
Section III : Repeat breeders.

Team and date	Number of cows	Commonest interval before heat induced (days)	Per cent. showing induced heat within 7–9 days	Conception rate to induced heat per cent.	Conception rate per cent. to next succeeding heat (interval from c.l. enucleation in days)
Section I :—					
1. Lindley, 1953	54		50 (9)	48	
2. Witter, 1957	166	55 per cent. on within 4	67 (7)		
3. Clark, 1935	68	3	70 (9)		
4. Schütte, 1947	62	Heat induced in 77·4 mean interval 5		61·3	
5. Rottensten & Kierkegaard, 1954 ...	1,552	3–4	51 (8)	50	60 at 19–28
6. Jakobsen & Teige, 1956	1,315	4	62·5 (7)	50–55 days 3–4 60, day 7, overall about 56	65–75 at 23–30
Section II :—					
7. Philipsen, 1954	252	4	83 (5)		
8. Hagelberg & Føgdegard, 1954 ...	449	35 per cent. on within 4	60 (8)	40	64 at 20–30
Section III :—					
9. Jakobsen & Teige, 1956	1,431	4	62 (7)	60–65 days 3/5 75, day 7. overall about 66.	75 plus
10. Macintosh, 1954	861		90 (9)	60	75
11. Schütte, 1947	80	Heat induced in 32·5 mean interval 5.		50	64

The following notes refer to the experiment of the same number :—

4. Eight cows responded to a *second* expulsion and 6 failed to do so.
5. Next succeeding heat as for Jakobsen and Teige below (6)
6. Next succeeding heat refers to cows in which heat was NOT induced within 9 days.
8. Next succeeding heat as for 6. Attribute low primary C.R. to poor "expression" of heat.
9. Difference in C.R. pattern attributed to suboestrous group being treated too soon after calving, involving *inter alia* poor expression of heat. Next succeeeding as for 6.
10. Therapeutic effect claimed but no controls. Next succeeding heat C.R. includes all cows not holding at induced heat.
11. A majority showed signs of endometritis. Therapeutic effect claimed. No controls. Low per cent. response in resetting cycle may be associated with endometritis effect.

using not infertile but random slaughter cow material (presumably most of the cows were reproductively normal) also found a 90 per cent. response, in this case as early as within 4 days. Hence there is the suggestion that the management and general functional status, *inter alia*, of the cows treated may affect the rapidity of the result. All 8 experiments which provide sufficient data indicate that 4 days is the commonest interval before the induced heat develops, and experiments 8 and 2 show that a majority of those exhibiting heat within 8 days have already come on by the 4th day, although the proportion showing from the 5th to 8th days is by no means negligible, and may exhibit, on the evidence of conception rates (Experiment 9), a *better-defined* heat period. Schütte is the only worker quoted in the Table who related subsequent cyclic behaviour to the state of the ovaries, as determined by an adequate series of rectal examinations. In all the other reports it is necessary to *assume* that when oestrus appears within 8 or 9 days it is a genuine induced heat and resets the cycle, an assumption likely to be correct in most cases. However, if a still well-developed 12th day corpus were enucleated, and heat appeared 8 or 9 days later (20 to 21 days after the last ovulation), this might wrongly be recorded as an induced heat. Thus Lindley (alone among the workers quoted) maintained 25 untreated control "anoestrous" cases, of which 32 per cent. showed signs of heat with 10 days, significantly fewer than the 50 per cent. of enucleation cases which behaved similarly. Further analysis on this question is necessary, but sufficient work has been done to justify the conclusion that enucleation is a reliable effective treatment for symptomatic anoestrus although the results from suboestrous and true retained corpus cases cannot be differentiated on present knowledge.

Enucleation Treatment of Repeat-Breeding Cases

Assessment of the value of enucleation is difficult in the absence of an adequate number of untreated control animals. Superficially, a conception rate of 66 per cent. at the induced heat obtained by Jakobsen and Teige (Experiment 9) in their repeat-breeder as contrasted with only 56 per cent. in the anoestrous cases suggests enucleation may be directly therapeutic. The authors, however, attribute this difference simply to the circumstance that the interval from calving to the induced heat was considerably longer in their repeat-breeder than in their anoestrous series—not surprisingly, since enucleation is probably most often requested for the cow less than 2 or 3 months calved which has not been seen on heat since. Their view is confirmed by the consistently improved conception rates obtained by them, and also in Experiments 5 and 8 for those cows showing heat only as late as 19 to 30 days after enucleation (presumably those having the cycle re-set with a silent induced ovulation within 9 days). The direct linear relationship between conception rate to first service, and length of the calving to first service interval has been well established. Thus the field remains open to compare repeating cows with suboestrous controls treated after similar calving to first service intervals and also with an untreated control repeating series.

The results obtained on repeat-breeders in Experiments 10 and 11 appear broadly similar to Jakobsen and Teige's. Both investigators had the strong impression that the intervention was effective, nearly all cows holding to the first or second subsequent service. On the other hand, McClure, Dun, and Dysart (1957) in a small controlled trial within a repeat-breeder problem herd in which the cause was not diagnosed, obtained a conception rate of 35 per cent. in 27 enucleation cases, while 14 untreated controls gave the same rate, inseminated at the next natural heat. The unusually low percentage of repeat-breeders in which Schütte (Experiment 11) was able to induce heat by enucleation may be connected with the fact that the majority of these animals, in addition to returning to service, showed frank symptoms of endometritis. Although Hess (1921) claimed a conception rate of 95 per cent. at induced heat, and Frei and Stäheli (1926) obtained 78 per cent., nobody has been able since to approach these levels, quite possibly on account of changes in husbandry and the type of stock kept. The question of the value of corpus luteum enucleation in the treatment of repeat breeding seems still to be quite unanswered. Dawson (1949, 1951) showed that the intervention was effective in certain types of purulent endometritis but these included only cases of true corpus luteum retention, hardly "repeat breeders" *sensu stricto*, although some had been served since the last calving but before failure of the cycle.

Immediate Hazards of Enucleation: Haemorrhage

Occasional deaths of cows (frequently stated to be the best in the herd) from internal bleeding directly consequent on corpus enucleation, continue to be reported over the years, and the extent of the risk involved is always discussed with lively interest by veterinary surgeons in dairy practice. Teige (1955) estimated the incidence of fatal or serious haemorrhage at from 1 in 1,000 to 1 in 9,000 enucleations. Hofer (1933) encountered a single fatal case in 12 years' intensive dairy practice, but another practitioner (Moore *et al.*, 1959) encountered 4 fatal cases, and an unstated number of serious ones which recovered, in a comparable period. Lindley (1953) observed that 3 out of his 54 experimental cases showed systemic depression after operation, and Heckhausen (1950) noted a raised pulse and temperature in 1 of 74 animals. Thus, judged by the clinical after-effects, the incidence of serious haemorrhage can vary from a negligibly low level to as high as almost 6 per cent. (Lindley, 1953). Regarding the causes of this variation, Hofer quotes the experience of Euler (1931), and of Hess (1921), that the best milkers are the most liable to bleed especially as they age; his own fatal case involved a 19-year-old high yielder. Chodkiewicz (1955) also recognised the connexion of liability to bleed with yield. Stormorken and Teige (1953) found that the blood of a cow which bled seriously, though not fatally, after enucleation contained only one-third of the normal level of pro-

thrombin. Feeding of oxalate salts (as contained for instance in beet tops) was found by Teige (1955) actually to reduce the blood level of ionic calcium, but the thrombocytes were nevertheless unaffected. However, it seems established that cows liable to bleed are already in a pathological state; administration of vitamin K to the case studied by Stormorken and Teige restored prothrombin level to normal, suggesting that the pathology is of nutritional origin; naturally the higher the yield the less likely is nutrition to be optimal. Euler had already (1931) given his opinion that heavy feeding on silage reduced clotting potential and so increased the risk of haemorrhage. Götze (1939) and Teige (1955) both concluded that the enucleation of a pregnancy corpus luteum was more dangerous in this respect than that of a dioestrous corpus, presumably the result of the nutritional demands of the foetus, added to those of lactation.

Thesing (1953) stated roundly that an exaggerated fear of haemorrhage too often deterred practitioners from a useful intervention. He described the use of normal saline and "artificial serum" up to 7 litres, with apparently good results, "to restore blood volume" in at least 14 cases showing alarming degrees of collapse after corpus enucleation. Heckhausen (1950) slaughtered 4 separate groups of cows 2 to 36 hours after enucleation to investigate the extent of the haemorrhage. In 25 cows the preceding ovulation had been accompanied by normal heat signs and 15 of these yielded more than 3 litres of free blood in the abdominal cavity. A further 32 cows were described as cases of "persistent corpus luteum" but from the context they would appear to have been cyclic suboestrous cases. Only 2 of this group yielded as much as one litre of free blood, none of the other 30 exceeding 500 ml. But four 6 to 12 week pregnant cows yielded 4 to 7 litres and each of 13 pyometra cases yielded over 4 litres. Manual after-compression of the ovaries was tried in half the cases of each group but did not seem to influence the results either way. As regards the pregnant cows, these results confirm the observations by Götze and Teige; it is interesting that only 1 of 32 cases to lose more than 3 litres of blood showed systemic signs during life. The consistently low blood loss by the cases of symptomatic anoestrus is not easy to explain. This anoestrous condition commonly accompanies intensive management for high yields, especially when feeding is imperfect, conditions which Teige, Hofer and Hess all expected would predispose to increased clotting time and hence free haemorrhage. It would on the other hand have seemed reasonable to postulate a better nutritional status and hence clotting potential in the more normal cattle of the first group.

Generally the risk from haemorrhage seems slight so long as enucleation is avoided in pregnant animals and in the highest yielding cows under intensive management.

Retarded Hazards of Enucleation: Adhesions and Cyst Formation

The development of bursal adhesions as an immediate consequence of corpus luteum expulsion has been observed in individual cases by a number of authors. Thus Rowson (1942) observed them associated with the reception of the enucleated corpus in the bursal cavity, and pointed out that the effect on oviduct function might seriously prejudice fertility. Umbaugh (1949) observed relatively copious bleeding in several cows, with subsequent development of rather massive adhesions. Moberg (1954) went so far as to allege that enucleation was the main cause of bursal adhesions, though he presented no evidence, and similarly Rasbech (1954) claimed the adhesion-producing effect of enucleation to be of serious economic consequence. Teige (1955) mentioned that Frank (1950) and Nielsen (1928) had also drawn attention to the possibility. On these grounds Roberts (1957) referred to Teige's paper as supporting his and Moberg's contention that enucleation is the commonest cause of bursal adhesions; Reuber and Emerson (1959) also gave Teige as an authority in this connexion. Yet Jakobsen and Teige (1956) explicitly concluded from their large scale trial that the normal conception rates they obtained after enucleation quite failed to support Robert's concept. Willett (1956) briefly mentioned the potential danger of adhesions resulting from enucleation, but Hill (1956, 1958) suggested that adhesions are apt to result only when enucleation is performed clumsily; Reuber and Emerson were inclined to support this view. From this literature it would seem that no quantitative data are yet available on the degree of adhesion-risk from enucleation, but in view of Umbaugh's observation, risk is probably greater in the type of cow which is more apt to bleed to excess. The condemnation of the practice of enucleation by Roberts and Moberg appears unjustified experimentally and the risk of undesirable results appears low on the evidence of Jakobsen and Teige's large scale trial. Dawson (1958b) published some factual evidence that the main cause of bursal adhesions was ascending (puerperal) infection rather than ovarian manipulation.

In addition to the danger of mechanical damage, corpus luteum enucleation can result in bringing the oestrous cycle to a standstill. Richards (1946) recorded arrest of the cycle for a lengthy period in 2 of 10 cases, and Schütte, in 1 out of 80. Teige (1955) recorded a personal communication from Rasbech, that cysts were inclined to develop when successive corpora were expressed in the same cow; this would probably imply cyclic stasis. McKay and Thompson (1958) deprecated the practice of enucleation because of the high incidence of cystic derangement which they claimed to have observed as a result. Foote, Zimbelman, Loy and Casida (1959) on a basis of detailed experimental findings confirmed that this hazard existed. Three of 21 heifers developed cysts after first enucleation; but as many as 6 of the remainder did so following enucleation of a second successive corpus, thus clearly confirming Rasbech's view. Foote *et. al.* (1959) also noted the occurrence of twin ovulations as a fresh hazard, 4 times after their 21 first enucleations but only once after a second enucleation.

Retrospect

This scrutiny of the recent literature suggested that the main deficiencies in knowledge of the subject of corpus luteum enucleation, included ignorance of its value in the treatment of repeat-breeder cows, as opposed to those with symptomatic anoestrus, and the need to repeat the interesting investigations of Heckhausen on the extent of haemorrhage resulting in different classes of case, since these gave very clear cut results quite different from those expected. A repeat-breeder investigation should involve control by observation of untreated repeat breeders and also of corpus-expelled suboestrous cases of comparable calving to service interval with the expressed repeaters, all cows being inseminated and followed until pregnancy could be diagnosed.

But besides such long term, large scale enterprises, there did appear to be gaps in available information, towards filling which a contribution might be made meanwhile, by studying in some detail a limited number of cows, with particular reference to their previous reproductive history, cyclic status and stage of cycle at which the corpus luteum was expelled. Among the effects of enucleation which called for especially careful note were the extent of any bleeding, the incidence and nature of any bursal adhesions which might result, and that of any stasis or interruption of the oestrous cycle such as the development of cysts. The efficiency with which the cycle became reset with or without external signs of heat would therefore require recording as an essential preliminary routine.

Part II.—An Experimental Study

Material and Methods

A total of 52 dry cows was used, of which 44 had been discarded for failure to breed and 8 control animals for other reasons such as poor yield, lameness or mastitis. Ideally, for experimental purposes cows should be studied as encountered in the field, at about 3 to 4 months calved and in full milk; this, for economic reasons, could not be arranged in the present study. However, as a rough approximation to the division into suboestrous and repeat breeder cases which appeared significant in the reports of earlier workers, the infertile cattle were separated into groups of 24 and 20 according as the endometrium appeared relatively normal on the evidence of stained microscopic sections—Group I—or on the other hand showed evidence of a severe degree of chronic endometritis—Group II. Massive fibrosis, destruction of a large proportion of the glands and/or their invasion by large numbers of inflammatory cells, and ablation of the surface epithelium were regarded as providing such evidence. This division was somewhat arbitrary as there were a number of borderline cases on each side, in particular discharging repeat-breeder cases with relatively normal endometria on section.

Both infertile groups had been served an average of 6 times each, but Group I contained a larger number of animals with a history of purely functional infertility; probably many of the cows in this group were in the process of recovering reproductive normality during the lapse of time since they last calved. Reasonably detailed histories were available for all the animals, and it was, in the case of the infertile cows, possible to determine the mean length of the oestrous cycle during the final service period for most animals involved—the known fact that individual cows continue with the same length of cycle was confirmed in collecting these data.

Cows were kept under observation until they had exhibited a normal ovulation and the corpus luteum of at least one cycle was expressed at a known interval after this. From pregnant cows (sent in error) corpora were expressed at once. No special effort was made to drop the corpora clear of the bursa. Observations on behaviour were made daily at free range and rectal and vaginal examinations made as necessary, on the average twice weekly. Four animals were killed 3 to 10 days after enucleation but most were maintained for 3 to 6 weeks subsequently, to follow the cyclic patterns. Genitalia were dissected; sections of the endometrium and serial sections of both oviducts were taken for histopathological examinations while the former was examined by cultural methods for the presence of bacteria. Thirty cows were bled before enucleation and 3 weeks after for serological investigations.

Induction of Cycle

It is generally accepted that the dioestrous corpus luteum attains full growth at from 6 to 8 days after the day of heat. Regression of the corpus may be apparent by the 12th to 13th day but frequently is not obvious before about the 18th day.

The results for Groups I and II are given in Table II in which the second column indicates a consistent difference of several days, between previous mean cycle length, and the sum of the age of the enucleated corpus plus the interval to induced ovulation. This circumstance gives a reasonable assurance that induction had actually taken place. In cow 365 pregnancy and dioestrous corpora were successively enucleated and a normal cycle was induced each time. Four Group I cases involved enucleation of the first corpus luteum to be formed after periods of cystic ovarian disease during which no cycle was maintained. One conceived to service at the induced heat; in 2 the induced corpus was subnormal; in the fourth case the cystic acyclic period resulted from stilboestrol administered to procure abortion; enucleation induced a cycle but the cystic condition returned at the same time, the case becoming one of "cyclic nymphomania" (Dawson, 1958a). In Group II one cow with a previously normal cyclic history produced an induced corpus with a life span of only about 6 days.

Group III. Normal Controls: Six new cycles were induced in 5 cows (66 to 77 per cent.), after enucleation at 5 to 13 days, 2 after 3 days and 1 each after 4, 5, 6 and 7 days. One partial enucleation proved effective. One cow from which successive dioestrous corpora were expressed exhibited a twin ovulation the second time. In one cow ovulation reappeared 8 days after enucleation and as

TABLE II
INDUCED OVULATIONS, NORMAL UTERUS AND ENDOMETRITIS GROUPS

Cow	Age of expressed corpus relative previous to mean cycle length (days)	Interval to induction (days)	Remarks
Part I : Normal Uterus : Group I.			
363	8/cystic	2–3	Cystic c.l. induced.
353	10/22	3	Twin ovulation induced.
328	14/21	3	
361	12/cystic	4	
365a	6 weeks pregnant	4–5	Abortion induced 3rd day
385	12/23	4	
365b	12/?	4	
380	12/?	4	
334	9/13–20	4	
311	7 weeks pregnant	4–5	Abortion induced.
349	14/23	5	3 days semi-oestrus before full induced heat.
352	9/11–15	5	Subsequent cycles 20 days or over.
354	/21	5	
325	/21	5	
336	14/cystic	6	C.l. crushed only. Short-life c.l. induced. Clinical endometritis.
327	10/23	7	Enucleation partial only. Twin ovulation induced.
356	under 10/over 23	7	3 days semi-oestrus before full induced heat.
369	8 weeks pregnant	No induction	Enucleation partial only. Pregnancy unaffected for 11 days.
369	9–10/cystic	8	Cyclic nymphomania induced.
Part II : Endometritis : Group II :			
386	10/20	2	
382	11/21	3	
341	11/23	3	
345	12/21	4	Despite early regression of preceding c.l.
375	12/	4	
381	10/21	4	Enucleation partial only.
318	12/24	4	Twin ovulation induced.
338b	9/	4	
344	12/cystic	4–5	Enucleation partial only. Twin ovulation induced.
346	9/22	5	Enucleation partial only. Twin ovulation induced.
347	14/21	5	Enucleation partial only.
348	11/21	5	
309	14/25	5	
338	11/cystic	5	
340	12–13/	5	Short-life c.l. induced.

NOTE: (1) a and b suffixed to a cow's number indicate results from two different enucleations at different times on the same cow.
(2) In cases exhibiting cystic ovarian disease over most of the period since the last calving it is not possible to determine a mean oestrous cycle length.

the mean cycle length was unknown this was not considered as an induced heat.

In all, 39 new cycles were induced in 36 cows, *i.e.* about 75 per cent.; 5 times after 14-day and 11 times after 12-day enucleations. Five partial expulsions and 1 mere crushing of the corpus proved sufficient to induce ovulation. Five primary and 1 second successive enucleations (14 per cent.) resulted in twin ovulations. As between groups little difference was evident, but there were the suggestions that normal controls came on heat quicker, confirming Dowling, (1949) and that a greater proportion of abnormal corpora resulted from induction, following an acyclic cystic period, in Group I. Possibly similar reasons caused some members of this group to be slower in attaining their induced ovulations. Prolonged semi-oestrus before ovulation was exhibited only by 2 cows of Group I.

Failure to Affect Cycle

Group I: In 4 cows (17 per cent.) ovulation returned only after the usual interval from the previous one. Two cases involved crushing of the corpus, at 9 days and 16/21 days, and in each of these there was a suggestion that the original corpus regenerated. The other 2 cases involved clean enucleations at 11/22 and 12/22 days. In the first of these, *heat signs* were induced after 3 days and post-oestrous vaginal bleeding after 5.

Group II: One cow in which oestrus and ovulation returned only 8 to 9 days after a 12-day clean enucleation.

Group III: In 2 cases, 1 involving crushing of a 9-day corpus and the other clean enucleation at 12 days, oestrus returned at the normal interval. In both, rectal examinations suggested that the normal corpus had regenerated.

The failures in the 3 groups may be summarised in this way. The cycle remained unaffected in 7 cows (13.5 per cent.) of which 3 cases involved a crushed corpus and 4 seemed to involve regeneration of the original organ. Heat signs and post-oestrous bleeding were nevertheless rapidly *induced* in 1 of the cases.

Cyclic Stasis

Group I: One cow showed stasis of the cycle in the follicular phase over 11 days to slaughter. Another showed stasis complete over 24 days to slaughter with the development of cysts, up to 3.0 cm. in diameter as measured *post mortem*. A third cow exhibited stasis for 24 days with the development of cysts up to 5.0 cm.; this condition resisted treatment by rupture, twice at a week's interval.

Group II: In 2 cows there was no appearance of actual or imminent heat or ovulation at slaughter 6 days after expulsion; one of these was a case of true retained corpus luteum with some degree of pyometra. One dioestrous enucleation was followed by 14 days' ovarian quiescence up to slaughter. Two enucleations of 3- and 8-week pregnancy corpora were followed by 3 and 5 weeks' ovarian quiescence, though in the latter case a non-ovulatory suboestrus (development of large follicle, uterine tone and cervical mucus) occurred after 5 days. Two cows developed cysts; in one these persisted for 12 days (2.5 cm.) to slaughter, though a suboestrus without ovulation was induced in 3 days; the other exhibited cysts up to 4 cm. for 20 days after a second successive

enucleation at only 5 days (thus confirming Rasbech, 1955), after which there was spontaneous return to a normal cycle.

Thus cyclic stasis resulted in 8 to 10 cows, of which 4 to 6 exhibited ovarian quiescence, and 4 cows (8 per cent.) developed follicular cysts. The cystic condition resolved spontaneously once, resisted repeated rupture treatment once, and persisted untreated for 12 and 24 days to slaughter twice. The rapid development of a suboestrus without ovulation in one quiescence case parallels the sequence in one unaffected cycle case of Group I.

Degree of Expression of Oestrus with Ovulation

Table III gives details of the results in each group, showing that in Groups I and III a small majority of the induced ovulations was accompanied by well-expressed oestrus, irrespective of the degree of oestrous expression at the preceding normal ovulation. In Group II, on the other hand, the situation is reversed, actually a slightly larger proportion of the induced ovulations were silent (about 65 per cent.) than were accompanied by heat signs in the other two groups.

TABLE III
EXPRESSION OF OESTRUS AT INDUCED OVULATION

Group I.			Group II.		
Cow	Nature of previous ovulation	Nature of induced ovulation	Cow	Nature of previous ovulation	Nature of induced ovulation
369	S	S	340	?	S
365b	S	S	344	?	?S
334	S	Oe	345	Oe	S
325	S	Oe	375	Oe	S
365a	Oe	S abortion	381	Oe	S
311	Oe	S abortion	346	Oe	S
328	Oe	?S	338b	Oe (i)	S
336	Oe	?S	341	Oe	W.n.s.
356	Oe	W.n.s.	348	Oe	W.n.s.
363	Oe	Oe	347	Oe	Oe
353	Oe	Oe	338a	Oe	Oe
361	Oe	Oe	382	W.n.s.	Oe
385	Oe	Oe	386	S	S
349	Oe	Oe	318	S	S
352	Oe	Oe	309	S	?S
327	Oe	Oe			
354	Oe	Oe			
380	Oe	Oe			
Group III					
367	Oe	Oe	373a	Oe	S
378	Oe	Oe	371	Oe	S
324	Oe	Oe	373b	S (i)	Oe
368	Oe	S	332	?	Oe

Abbreviations : Oe —oestrous.
S —silent.
Oe or s (i)—oestrous or silent (induced).
W.n.s.—some heat-like signs, would not stand.

Incidence of Haemorrhage

As the policy was to study the cyclic behaviour for some time following enucleation, no cow was slaughtered earlier than 3 days after expulsion and only 4 earlier than 10 days, most being run on for over 3 weeks. The only direct available method for estimating the extent of haemorrhage therefore, was observation for external systemic signs during the 24 hours after the manipulation, and in no case were such signs apparent. The incidence and size of blood clots on the ovaries, usually in the enucleation craters, as detected *per rectum* and *post mortem* has therefore been recorded, on the assumption, for which there is no proof, that such clots may give some guide to the amount of bleeding which took place. In the majority of cows no craters or clots survived to the time of slaughter.

Group I: Of 4 cows which showed silent ovulations preceding enucleation, 2 showed on dissection no signs of bleeding, 2 showed each a 5 mm. blood clot, when slaughtered after 5 and 15 days, respectively. Of 18 cows showing well expressed oestrus before expulsion of the corpora, 13 showed no signs of bleeding, while 5 did; one of these had a clot of 5 mm. diameter after 24 days, 2 had 7 mm. clots at 23 and 53 days and 2 had 10 mm. clots after 11 and 16 days.

Group II: Of 5 cows which showed silent ovulations preceding enucleation, 4 showed no sign of bleeding and 1 yielded a 5 mm. clot after 14 days. Of 14 cows showing well-expressed oestrus before enucleation, 10 showed no signs of bleeding, 1 showed a 25 mm. blood clot after 21 days, 2, 10 to 12 mm. clots after 6 and 36 days, and 1 a 5 mm. clot after 36 days.

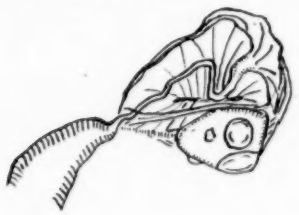
Group III: Four cows showed clots, of which 2 exhibited good preceeding oestrus; both yielded clots of 10 mm. at *post mortem*, but in one of these a clot of about 40 mm. was rectally palpable 5 days after enucleation; 1 showed suboestrus and 1 showed some heat signs but would not stand. These 2 yielded only 5 mm. clots. The other 4 cows in this group yielded no signs of haemorrhage and all showed good preceding oestrus.

Overall 31 cows showed no signs of bleeding and 21 yielded clots; the largest clot on dissection measuring 25 mm. diameter. Of 11 previously suboestrous cases, 5 yielded clots but none exceeded about 5 mm. in diameter. On 38 previously well-expressed oestrous cases 11 yielded clots, but 8 were 10 to 25 mm. Thus as between "suboestrous" and "repeater" cases there is little difference as to whether or not bleeding occurred, but a definite suggestion that previously oestrous "repeater" cases bleed more freely.

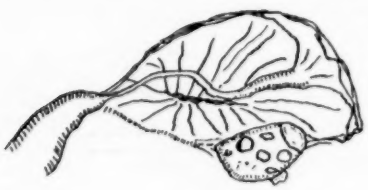
Incidence of Bursal Adhesion Formation

Appearances requiring description in this connexion were produced in 5 cows. In 1 the expressed corpus could be felt diminished in size, hanging by a fibrous strand from the ovary 4 days after expulsion; it was not palpable 3 days later and there was no *post-mortem* sign of it. In the second cow a relatively large blood clot of 25 mm. was found, attached by strong fibrous strands low on the lateral bursal wall near the fundus. From its situation, comparable in effect with the lump of bursal fat normally found in well-nourished cattle, this clot did not seem likely to interfere with tubal function

although Hill (1958) has suggested that the fat lump at the fundus may sometimes do so. The weight of this when excessive certainly anchors the bursal rim and simulates the effect of pathological adhesions on rectal examination. A third cow exhibited a small blood clot and smaller expressed luteal remnant, adherent between medial pole of the ovary and the small normal "ovulation adhesion" at this angle of the bursal entry, in no way interfering with bursa or oviduct. However, in the last 2 cases there was the possibility of harmful effects by the changes observed. In one a strong ribbon adhesion 20 × 7 × 3 mm. stretched between the medial rim of the bursa and the lateral pole of the ovary. It could have prejudiced the pick-up of the ovum by the funnel, though much less likely to do so than the typical pathological adhesion arising from ascending infection (Fig. 1). This cow was served at the induced



Cow 334: distortion of bursa by ribbon adhesion from isthmus to ovary.



Normal Bursa showing tip of uterine horn, oviduct and ovary.

FIG. 1.

heat and did not conceive, ovulation occurring on the affected side. She had, however, a prolonged history of inadequate luteinisation. In the other cow a 12 mm. organising blood clot incorporating a small enucleated luteal remnant was adherent to the bursal wall in a significant position, above the oviduct and close to the pavilion. This animal was served at the induced heat and conceived, but to ovulation in the *opposite* ovary. The sections from the oviduct with the adhesion showed evidence, not conclusive, of blockage in the isthmus region. This was the only animal in this series in which such evidence was seen.

Notes on Service Results, and Enucleation of Pregnancy Corpora

One cow of Group III was served (and conceived) at the induced heat, and 2 were served in Group II; the first of these did not conceive, the induced corpus having a life-span of only about 6 days, contrasting with the normal 10 to 12. The second cow was that which conceived from ovulation in the ovary on the side opposite to that in which an adhesion was induced. It was thought more important to arrange service for cows in the normal uterus Group I, as from the circumstances its result here was less predictable—possibly an important proportion might have regained their fertility with the lapse of time in the absence of permanent genital lesions. Eleven cows were served at the induced heat and 3 conceived, including 2 which did so immediately following acyclic cystic periods. Each of these yielded twin sets of foetal membranes of which in each case one set was moribund (Hinze, 1958, described a raised incidence of twinning following periods of cystic disease). Of the remaining 8 cows, 1 did not ovulate following the induced heat and entered upon an acyclic cystic period; 1, following cystic disease, with clinical endometritis, developed a short-life induced corpus; one developed a substandard hollow corpus having previously shown a sequence of 11- to 15-day cycles; one exhibited twin induced ovulation. Omitting these cases still functionally abnormal, out of 7 cows served at induced heat, 3 or 43 per cent. conceived—almost a normal rate (*cf.* Hagelberg and Føgdegard's experiment which gave a rate of 40 per cent.).

Attempts were made to enucleate corpora in 5 pregnant cows. In 1 the first try at 15 days resulted in crushing only, the corpus regenerated and was partially expressed, in a crumbling condition, at 21 days. Abortion was induced and was followed by 3 weeks' stasis of cycle. Another underwent clean enucleation in the eighth week; abortion was rapidly induced and was succeeded by 5 weeks' cycle stasis, despite suboestrus without ovulation at 5 days. Despite their having been pregnant, both these belonged to the endometritis Group II. Two cows of Group I underwent clean enucleation at 6 and 7 weeks; in both cases a suboestrus and normal subsequent cycle was induced, within 4 to 5 days and following abortion. The last cow was 8 weeks' pregnant, when only a partial expulsion could be carried out. Eleven days later the pregnancy was unaffected, having continued to develop. Abortion was induced with oestrogen. Dissection revealed a small blood clot and adhesion on the ovary, containing a minute luteal remnant suggesting that about 10 per cent. by volume of the corpus had remained attached to the ovary at the time of enucleation. In contrast to the luteal regeneration demonstrated by the first case, it seems unlikely that in this case it was luteal tissue left *in situ* which allowed the pregnancy to continue. This short series suggests that the pregnancy corpus is more difficult than the dioestrous to enucleate cleanly and that enucleation is more apt to result in stasis, but provides no evidence of increased risk of haemorrhage.

Discussion and Conclusions

Apart from the endometritis group (II), about 50 per cent. of previously suboestrous cases showed visible oestrus with the induced ovulation, confirm-

ing previous work on this point. Evidence was obtained that enucleation as late in the cycle as 14 days (12 per cent. of inductions) and 12 days (26 per cent.) was equally efficient as at 8 to 11 days in inducing ovulation. A further observation with useful practical application (especially in the treatment of cyclic stasis as well as of suboestrus) was that partial expulsion of a crumbling corpus (which is often all that is possible with a "truly retained" one) seemed as efficient as a clean enucleation in resetting the cycle, contrary, for instance, to the belief expressed by Herrick (1952). On the other hand, where the attempt to expel resulted only in crushing, failure in induction was the rule. Crushing seems more likely to result when the corpus is either immature or senescent. Only in 1 case did crushing successfully induce ovulation. Serial rectal examinations suggested that in 3 of the other 4 crushing cases the corpus regenerated at the crushing site. In one regeneration case, pregnancy continued unaffected; in all the other 3 (empty) cows, ovulation recurred after the normal interval. The "expression of oestrus" results at induction yielded by Group II were in marked agreement with those Schütte (1947) obtained; he found visible oestrus at induction in only 33 per cent. of endometritis as contrasted with 77 per cent. of suboestrous cases. Here, though with smaller numbers, the corresponding figures were (again) about 33 per cent. for endometritis cases, and about 66 per cent. for normal uterus cases.

The main interest of the work now reported lies in the information provided about the hazards and limitations of corpus enucleation. Minor hazards were found to include the risk of inducing twin ovulations, which resulted from 14 per cent. of the inductions in the series, a significant proportional incidence though less than half of that recorded by Foote *et al.* (1959) who appear to have been among the first to note this effect. The results of the service trials indicated that early foetal death of one twin might greatly reduce the undesired incidence in dairy cattle of twin births which would ensue. Failure of treatment to influence the cycle occurred only in 7 cows or 13.5 per cent., and 3 of these cases involved crushing of the corpus, with the suggestion that expulsion was attempted too late or too early. Finally in this section come 5 cases (almost 10 per cent.) in which the induced oestrus was of a deceptive nature as regards the prospect of conception. Two cows showed semi-oestrus for 3 or 4 days before ovulating, and 3 cows exhibited oestrus or suboestrus without ovulation.

The major hazards according to the literature are haemorrhage and the risk of adhesion formation. About the former some facts are already on record but about the latter little beyond speculation has been published. The somewhat indirect method used to estimate extent of haemorrhage in the present work is only qualitative, but it indicated that bleeding was negligible in 60 per cent., and no systemic sign of it was observed after expulsion in the other 40 per cent. (whereas Lindley (1953) observed this in 3 out of 54, a similar number of cases). As far as could be judged, where appreciable bleeding took place the rather surprising differential observations of Heckhausen on its extent as between previously "suboestrous" and "oestrous repeating" cases received a measure of confirmation. Thus no clot recovered from a suboestrous case exceeded 5 mm. in diameter, recalling Heckhausen's mean figure of half a litre of free blood recovered from such cases. Eight of 11 clots found in previously oestrous cases measured from 10 to 25 mm. in diameter some weeks after enucleation: Heckhausen's comparable figure for free blood was 3 litres. Again as Heckhausen indicated, the pyometra and one of the pregnancy cases in the present series produced larger clots. The reasons for this difference require to be sought through further experiment.

Various writers, notably in Scandinavia and America, have held the risk of bursal adhesion formation to be so great as to justify discard of the practice of corpus luteum enucleation. However, in this series, although adhesion formation occurred to some extent in as many as 5 cows, or nearly 12 per cent., 3 of these adhesions appeared trivial, slight and unlikely to affect the function of the oviduct. This left 2 cases, or less than 4 per cent. with adhesions which might have affected fertility, though 1 of them conceived at the induced heat (to opposite ovulation). Only 1 oviduct showed a possibility of endosalpingitis. The conclusion seems justified that the risk from adhesion formation has in the past been much exaggerated.

The danger of causing cystic ovarian disease by corpus enucleation has received much less attention in earlier publications, though it has been mentioned by 4 investigators. In the present experiment this derangement was provoked in 4 cows (nearly 8 per cent.): in the least serious case it resulted in a further loss of 20 days' time before resolving, 2 cases showed no signs of doing so after several weeks and the worst case resisted what is regarded as adequate treatment. Cyst formation was much the greatest risk, economically speaking, in carrying out enucleation on the subject material used. A further 4 to 6 cows showed varying periods of up to 5 weeks of cyclic stasis without cyst formation (as previously reported by Richards and by Schütte). Thus there was a 20 per cent. risk of undesirable consequences of this type resulting, though a somewhat lower risk rate might be expected in the normal type of suboestrous patient. Enucleation seems contra-indicated following a recent period of cystic disease or one of cycles showing some, but inadequate, luteinisation.

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Hermaphroditism in a Bitch. A Case Report

BY

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SUMMARY.—1. *A case of hermaphroditism in a bitch is described.*

2. *The incidence of neoplasia in abdominal testicular tissue is discussed together with a possible explanation for the development of the anomaly.*

Introduction

ABNORMALITIES of development of the genital tract are frequently seen in the pig and goat, and the freemartin heifer, co-twin to a bull, has been analysed in some detail by Arthur (1959). Swett, Matthews and Graves (1940) estimated that freemartinism occurs in 11 out of every 12 cases of heterosexual bovine twins. Among the criteria listed as being suggestive of freemartinism, Arthur included enlargement and protrusion of the clitoris together with a well marked tuft of vulval hair. The gonads were described as small and non-functional. Amongst many references in medical literature, Taub (1954), Arneaud, Annamunthodo, Pinkerton and Cole (1956) and Gresham and Fairgrieve (1960) all describe cases in which abnormalities in development of the external genitalia were related to abnormalities of the gonads.

Case Report

The subject was a 14-month-old Cocker Spaniel bitch. She was bought as a puppy and no abnormality was noticed. The owner was prompted to seek advice owing to the fact that the bitch had developed a phallic projection from the lower commissure of the vulva, and had shown no visible sign of oestrus.

On examination the vulval projection consisted of a greatly enlarged clitoris (42 mm. long by 12 mm. diameter) arising from the clitoris fossa and containing a distinct bone. Vaginoscopic examination showed that the urethral opening was in its normal position on the vaginal floor and had no connexion with the abnormal clitoris.

It was pointed out to the owner that the bizarre development of the clitoris might be associated with abnormalities of the gonads, and he agreed that ovaro-hysterectomy should be carried out in conjunction with the surgical removal of the offending projection.

At operation adequate exposure was facilitated by a midline episiotomy. An incision was made over the long axis of the rudimentry os penis, which was dissected free and the soft tissue surrounding it was excised at the base of the clitoris fossa without difficulty. The episiotomy was closed by 3 layers of sutures. Ovaro-hysterectomy was then carried out. The cervix and uterine horns appeared normal, but both gonads were very large and hard.

Subsequent histological examination revealed the

Corpus Luteum Enucleation in the Cow: Therapeutic and Traumatic Effects.—*Concluded.*

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R. G. WALKER—HERMAPHRODITISM IN A BITCH. A CASE REPORT

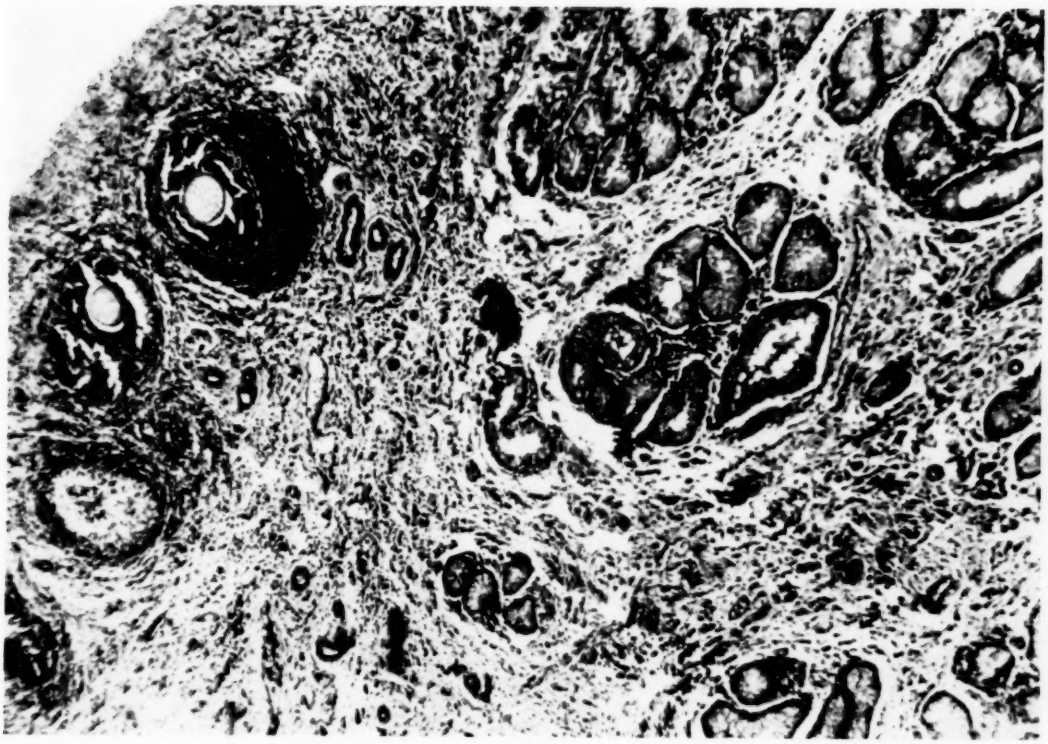

FIG. 1. Ovaro-testis. Note Graafian follicles with ova, and also many seminiferous tubules. There is a good deal of fibrous interstitial tissue and interspaced in this, deeply staining interstitial cells. Stain H/E. × 60.

gonads to consist of a cortex of ovarian tissue with a medulla of testicular tissue. The ovarian section was active, showing developing follicles some of which contained primary oocytes, whereas the testicular portion contained relatively inactive seminiferous tubules with appreciable interstitial tissue (Fig. 1).

Discussion

The fact that testicular tissue was present in the gonads is of interest, not only from the endocrine aspect, but also due to the tendency for neoplasia to develop in testicular tissue retained within the abdominal cavity. Haines and Grabstald (1950) reported that 10 to 15 per cent. of all testicular tumours in man are found in undescended testes, and Scully and Coffin (1952) reported a 5 per cent. incidence in a series of 177 testicular tumours in dogs. The reason for this is obscure. Taub (1954) considered that the higher intra-abdominal temperature may be a contributary factor, and pituitary imbalance with increased hormonal secretion may also play a part (Twombly, 1950). Smithers (1960) supports this view, and suggests that the poorly functioning testicular tissue fails to depress pituitary hormone at a time when the normal "feed-back" mechanism comes into play, and that continued stimulation eventually induces tumour formation.

Arneaud, Annamunthodo, Pinkerton and Cole (1956) reported a case of true hermaphroditism in which the genetic sex of the patient was female, but the psychic sex strongly male. At laparotomy the internal genitalia were predominantly female, the right gonad being a normal ovary whereas the left gonad was an ovaro-testis with macroscopic differentiation of the two types of tissue, confirmed by biopsy. Ovaro-hysterectomy was carried out, leaving behind merely the testicular portion of the left gonad.

Lennox (1960) reviewing the early differentiation of the embryonic gonad states that if the genetic constitution of the germ cells reaching the gonadal site are XX, the cortex of the primitive gonad develops into an ovary; if XY the cortex atrophies and the medulla develops into testis. The testicular medulla and ovarian cortex of the gonads in this case suggests an early genetic failure of complete differentiation.

In 1947, Jost showed that whatever the sex of the gonad, if it is removed from an early mammalian embryo, the result is always an apparent female at birth, in other words that in the absence of gonadal stimulus the Mullerian system develops and the Wolffian degenerates. On the other hand, Mullerian atrophy and Wolffian development necessary for the production of male anatomy demands the active intervention of hormones produced by foetal testicular tissue. If partial failure of embryonic testicular endocrine activity occurs during the stage of genital differentiation, or the male "hormone" is derived from an adrenal producing excessive androgen, as in congenital adrenal hyperplasia in man (Eberlein & Bongiovanni, 1956) or from another foetus as in the bovine freemartin (Lillie, 1917), then only a partial masculinisation of the external genitalia will occur. Such a set of circumstances would seem to have prevailed in this case. It would therefore seem justifiable to examine the gonads of any individual showing masculinisation of predominantly female external genitalia, to rule out the possibility of testicular tissue being present.

Acknowledgment.—The histological examination of the gonads and the microphotograph of the tissue were undertaken by A. R. Jennings, M.A., M.V.SC., M.R.C.V.S., whose help I most gratefully acknowledge. My thanks are also due to R. J. Turner, M.R.C.V.S., who referred the case to me.

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LATE DELIVERY OF "THE VETERINARY RECORD"

The Editor would like to thank those readers who have been good enough to write to him about this matter. The largest possible number of letters would be welcome, as it is hoped to supply the postal authorities with a very full dossier of our legitimate complaint of grave inadequacies in the postal services, so far as this journal is concerned.

COURSE FOR OVERSEAS VETERINARIANS

Eighteen veterinarians from 11 countries will arrive in London on July 16th for a 2-week British Council course on the control of the major infectious diseases of animals.

The course presents an account of the latest methods used in the control of the major diseases of cattle, sheep, pigs and poultry, and lectures will be given at the Royal Veterinary College, University of London, by specialists from different areas in the U.K.

Visits will also be made to laboratories and institutes engaged in research into animal disease problems.

The veterinarians come from Belgium, Finland, France, Germany, Ghana, Iceland, Italy, Netherlands, Norway, Nyasaland and Yugoslavia.

Current Literature

ABSTRACTS

Accidents and Emergencies in Anaesthesia. HALL, L. W. (1959). *Mod. vet. Pract.* **40.** 28.

Heart Failure

Ventricular fibrillation occurs uncommonly; it is seen in hypoxic states, such as in anaemic and shocked animals. Cardiac arrest is the more common form of heart failure and is caused by an overdose of anaesthetic. It is indicated by the absence of pulse, the cessation of bleeding at the operation site, pallid mucous membranes, and wide pupillary dilatation. Respirations continue until the respiratory centre becomes hypoxic. Counter measures for both types of heart failure consist of artificial respiration by positive pressure and cardiac massage. A thoracotomy incision is made rapidly and the ventricles squeezed rhythmically. Cardiac massage must start within 2 to 3 minutes of cardiac arrest; if delayed more than 4 minutes severe damage to the central nervous system may result. The chest is closed once spontaneous beats have been present some minutes, but spontaneous respiration may not return for several hours. Analeptic agents are best withheld—since they intensify the consumption of oxygen by neural tissue and increase the possibility of permanent damage.

Circulatory Failure

The usual cause of circulatory failure is haemorrhage. It is best treated by the transfusion of compatible whole blood; alternatively, plasma, serum, or dextran, should be used. Speed of replacement is essential, and this can be accomplished by pumping the fluid intravenously *via* a wide-bore needle or cannula.

Respiratory Failure

This common happening is usually due to an overdose of an anaesthetic agent. It is best treated by artificial respiration as most respiratory stimulants are transient in effect.

Respiratory Obstruction

Endotracheal intubation overcomes the common cause of obstruction, namely, contact between the tongue and the pharynx, but it should be remembered that a tube may become kinked or blocked with mucus.

Respiratory obstruction may be caused by laryngeal and bronchial spasms. The former is seen most often in cats anaesthetised with ether. The administration of a relaxant drug will allow intubation and hence relieve the obstruction. The latter occur mostly in ruminants and its imminence is recognised by a bout of coughing, after which the larynx closes unless a tube is in place. Usually the spasm relaxes, the animal gasps, and respiration is resumed. Bronchial spasm may often be relieved and its recurrence prevented by the intravenous injection of a spasmolytic agent such as pethidine hydrochloride.

Apart from the sections that have been abstracted above, the article also deals with Cardiac Arryhthmia; Aspiration of Regurgitated Material; Fires and Explosions; Complications Associated with Local, Regional, and Spinal Anaesthesia; and Complications Associated with the Use of Relaxant Drugs.

G. C. V.

Morphology of the Bovine Placenta at Normal Delivery. BJORKMAN, N., & SOLLEN, P. (1960). *Acta vet. scand.* **1.** 347.

Little is known about the factors which cause the separation of the placenta from the maternal tissue shortly after calving. For this reason the authors examined, by histological and electromicroscopical methods, the placenta and maternal caruncles of 7 healthy cows, from all of which the afterbirth came away in less than 3 hours after calving. The length of time between calving and separation of the afterbirth suggests that physical factors, such as the fall in placental blood pressure with the rupture of the umbilical cord, are insufficient to explain the separation. The authors have observed an area of intense staining at the junction of the foetal and maternal tissues and as this is less marked in areas where the chorionic villi do not separate, it is possible that it represents an enzymatic action. After the placenta has come away, it was observed that the epithelial surfaces of both maternal caruncles and placenta were, to a large extent, intact.

Acute Overeating with Cereals in Ruminants. BROBERG, G. (1961). *Nord Vet.Med.* **13.** 119.

Many aspects of overeating of cereals in the ruminant are considered in this thesis. The symptoms are apparently related to the absorption from the intestine of the excess lactic acid produced in the rumen. It was observed that a transient high lactic acid blood level was of little significance; whereas in cases in which the blood lactic acid was maintained at a high level, the outcome was fatal. Experimentally, in the sheep, the author demonstrated the importance of the rate of intestinal absorption by administering lactic acid by catheter into the duodenum. The addition of thiamine increased the body's ability to deal with lactic acid. It is pointed out that though thiamine is not normally deficient in the ruminant, in cases with destruction of the ruminal flora deficiency of thiamine may occur. Suggested treatment is 2 to 3g. thiamine administered intravenously, and oral administration, where the condition of the animal permits, of about 2 lb. baker's yeast. Attempts to neutralise the acid contents of the rumen are contra-indicated and treatment with Ca is unnecessary and dangerous.

H.B.

News and Comment

RETIREMENT OF MR. H. V. HUGHES

(*From our Liverpool University Correspondent*)

On the afternoon of June 28th, in the museum of the new veterinary building, the Vice-Chancellor of the University (Sir James Mountford) was present at a gathering of colleagues and their wives, friends and former students assembled to pay tribute to Mr. Howel V. Hughes on his retirement from his appointment as Reader in charge of the Department of Veterinary Anatomy.

The Dean of the Faculty of Veterinary Science (Professor J. G. Wright) presided over the assembly and expressed the feelings of those present when he spoke of all that Mr. Hughes had done for the School during his 41 years on the staff. He had seen its development from its earliest humble abode to the very commodious building in which his Department is now housed. He recalled Mr. Hughes's years as a student, he having registered in 1913, his service in the R.A.V.C. during the 1914-18 war, and his return to the University, first as a student, then as a member of staff where he became successively Demonstrator, Lecturer, Secretary of the Board of Veterinary Studies, and finally Senior Lecturer and Reader in charge of his Department. He further recalled that Mr. Hughes has the unique distinction of being the first person to obtain the Liverpool degree of B.V.Sc. The Dean then went on to pay tribute to his work as an anatomist and also to his kindly character which was combined with an unyielding firmness in matters of principle. Mr. Hughes was then presented with a handsome cheque as a token of the good wishes of many friends and former students.

Mr. Hughes, in his reply, made most interesting reference to the past history of the School and its relationship to the University as a whole, and did so with that kindliness and modesty which have always been such marked characteristics of him both as a colleague and teacher. Others, among them Professor D. L. Hughes, Mr. J. W. Dransfield, Mr. A. C. Shuttleworth and Dr. G. O. Davies then added their tributes and good wishes to both Mr. and Mrs. Hughes.

Several letters of apology and good wishes were received from friends unable to attend.

The tea party which followed allowed everyone present an opportunity to chat to Mr. and Mrs. Hughes and wish them well in their retirement.

FURTHER FINDINGS IN FRENCH MOULT

A further interim report on research being carried out under the sponsorship of the National Council of Aviculture has been published in *Cage Birds*, December 1st, 1960.

In a previous report (*Vet. Rec.* **72**. 108), Dr. T. G. Taylor described experiments designed to determine what nutritional deficiency might be responsible for French moult in budgerigars. The present report records the extension of this work to include further dietary factors.

The feeding of milk was found to have a very beneficial effect on growth rate, but none on the incidence of French moult. In subsequent experiments, therefore, milk was included in the basal diet of all breeding pairs, which otherwise consisted of Panicum millet treated with cod-liver oil, vitamin E, sea sand and oyster shell. No green was fed.

The following nutrients have now been added to the basal diet in attempts to affect the incidence of the condition. A complete vitamin B supplement plus vitamin K, a mineral supplement containing magnesium, manganese, zinc, bromine, iron, copper, cobalt, fluorine, boron, molybdenum, iodine and selenium in appropriate amounts, and the same mineral supplement with higher levels of copper, zinc, manganese, and with the addition of silicon. None of these supplemented diets reduced the incidence or severity of the disease; in fact the severity was greater where the vitamin B supplement was included.

Further work is in progress, and a purified pellet diet has now been devised which budgerigars will eat readily, which will greatly facilitate future experiments.

THE R.C.V.S. TRUST

The committee of management has awarded the first International League for the Protection of Horses Scholarship to Mr. A. Littlejohn of Mooi River, Natal, South Africa.

Mr. Littlejohn will be working at the Royal (Dick) School on research into the plasma electrolyte picture during and after operations on the equine bowel; and into the pathogenesis and prevention of surgical shock during and after operations on the equine bowel. He is a graduate of the University of Pretoria.

THE BRITISH VETERINARY POULTRY ASSOCIATION

The B.V.P.A. was formed in 1956 for the purpose of facilitating discussion and the exchange of ideas and views amongst those engaged in the veterinary aspect of poultry husbandry. Since the inaugural meeting, the Association has met 3 times each year, and the membership, which is open to all veterinary surgeons, has now increased to 100. The 1961 summer meeting will be held at the B.O.C.M. Experimental Farm, Stoke Mandeville, and following this at Messrs. Thornber Bros. hatchery at Reading, on July 11 and 12th (for details see under Notices). Members of the profession who wish to join the Association are asked to write to the secretary.

CANINE DISTEMPER VIRUS COMPLEX

The General Secretary issued the following press notice, on behalf of the B.V.A. on June 29th:—

Within the last few days considerable press publicity has been given to an alleged new virus disease affecting dogs and producing high mortality.

The British Veterinary Association is aware that for at least three months there have been instances where both unvaccinated dogs and those vaccinated against distemper/hard pad have exhibited symp-

toms similar in some respects to distemper. The virus syndrome in dogs is very complex but it is not felt that the cases reported justify the title "epidemic" which has been accorded in many press reports.

In our present state of knowledge we would advocate strongly that unvaccinated dogs of all ages should be vaccinated against distemper/hard pad as soon as possible. As a justifiable and precautionary action, particularly in view of the varying individual ability of dogs—like humans—to produce antibodies against disease, dogs which were vaccinated against distemper/hard pad disease over 18 months ago might well be revaccinated.

MRS. BARBARA ANN PEARCE

Mr. D. S. Barbour writes:—

The many friends of Mr. and Mrs. J. W. R. Pearce would learn with deep regret of the passing of Barbara on June 18th. She had not been in very good health for some considerable time but her sudden death after undergoing what would appear to have been a successful operation came as a shock.

A Londoner by birth, she had a passionate love of the country; all animals, and of everything that the soil produced. She was wonderfully endowed by nature for the profession which she chose: she knew no fear, her quiet approach and gentle handling inspired the utmost confidence in all animals, and her patience with them was inexhaustible. In addition, she was possessed of skill, knowledge and a balanced judgment very much above the average.

In 1936 Barbara was appointed to the veterinary staff of Devon County Council, having the distinction of being the first woman ever to be appointed to the veterinary staff of a local authority. When the staffs of local authorities were absorbed into the Animal Health Division of the Ministry in 1938, she became the first woman Veterinary Inspector of that Ministry, which she continued to serve until her marriage.

She was an ideal colleague, always loyal, unruffled, willing to help anyone and anxious to do her very best; and in her work invariably conscientious, painstaking and never sparing of her time and patience.

To John Pearce, their boys Paul and Guy and to her mother, Mrs. Hutton, the deepest sympathy of everyone will be extended in their great loss.

The funeral took place at St. Nicholas Church, Sulham, near Reading, on June 23rd. Amongst others present were Mr. and Mrs. R. A. A. Beament, E. T. Camps, A. C. Gillespie, Mr. and Mrs. A. M. Graham, J. C. Meikle, N. D. Ritchie, Mr. and Mrs. A. W. Smith, A. J. True, A. H. Watson and D. S. Barbour, also representing Sir John Ritchie, C.B., and the veterinary staffs of the Ministry's head office at Tolworth and Edinburgh.

IN PARLIAMENT

In the House on June 26th Sir A. Hurd asked the Minister of Agriculture what progress there had been in the Argentine Government's compulsory vaccination scheme against foot-and-mouth disease, and whether there was yet any significant effect on the risk of infection being brought to this country. The Minister said that the Argentine campaign was making progress and that in the province of Buenos Aires, from which came most of the meat exported to Britain, about 80 per cent. of the cattle had been vaccinated. It was too early to assess any benefit from lowered infection risks over here.

Mr. Woodburn asked whether farmers in this country should now use vaccination techniques. The Minister replied that the slaughter policy continued, and many other countries would like to reach a stage when they could follow the slaughter policy also.

UNIVERSITY NEWS

Bristol

Final examination for the degree of B.V.Sc. (Section II, completing examination) (Veterinary Medicine and Veterinary Surgery)

Baker, J. R.; Brodrick, T. W.; Clarke, Miss Z. E. Y.; Dear, J. P.; Edwards, H. G.; Edwards, J. C.; Gibbs, Miss C.; Gill, G. P.; Gould, L. A.; Graham, J.; Higham, D. A.; Hill, T. J.; Shepherd, D. A. L.; Stuart, A. N.; Trowbridge, D. A.; Whymark, T. R. C.; Wilson, M. R.

Second examination for the degree of B.V.Sc. (Sections I and II) (Section I = Anatomy, Physiology and Pharmacology)

Alps, B. J.; Beadman, Miss R. M.; Cooke, W. N.; Housden, J. E.; Rodale, Miss P. A.; Steadman, Miss M. M.

In Section II (Animal Husbandry I) completing examination

Adams, T. E.; Davison, P. J.; Drew, C. I.; Forbes, J. S. R.; Hewett, C. D.; Hodges, R. T. (Distinction in Animal Husbandry I); Hurst, T. S.; Johnson, C. T.; Lodge, D. (Distinction in Animal Husbandry I); Maidment, D. C. J.; Monahan, Miss C. M.; Nicholson, R. D. S.; Roberts, C. J.; Ward, W. R. (Distinction in Animal Husbandry I); Watkins, J. D.; Wilson, M. S.

First examination for the degree of B.V.Sc. In Physics, completing requirements

Baker, I. D.; Cowen, T.; Jones, Miss W. S.; Waddington, Miss B. A.

Cambridge

The following passed the final examination for the degree of Bachelor of Veterinary Medicine at the end of the Easter Term:—

D. C. Anderson (Queens' College), K. M. Butt (Sidney Sussex College), T. L. R. Cromwell (Sidney Sussex College), R. E. W. Halliwell (Special Merit) (Gonville and Caius College), J. K. Henwood (Jesus College), and J. D. Temple (Queens' College).

They were admitted to membership of the Royal College of Veterinary Surgeons by the President, Mr. Guy Anderson, at a ceremony held at the School of Veterinary Medicine on June 24th, following conferment of the Vet.M.B. degrees at the Senate House.

Edinburgh

The undermentioned candidates have passed the Final Professional Examination (Part I) in the subject of Veterinary Hygiene for the degree of Bachelor of Veterinary Medicine and Surgery:—

Brown, Byron J.; Cathcart, Hugh A. A.; Clark, William A.; Copland, Alexander N.; Forbes, Anne; Forrest, Dougal T. M.; Foster, William N. M.; Frankland, Anthony L.; Grant, Donald G. A.; Grave, Jill B.; Gribbin, Henry J.; Hill, Michael R.; Kelly, James M.; Linklater, Karl A.; Linscott, Thomas B.; Loughery, Samuel; Martin, Ronald N.; Ross, Ian C.; Taylor, William P.; Thompson, Robert

S.; Waters, Richard J.; Whaley, Francis H.; and Wrathall, Anthony E.

The undermentioned candidates have passed the Third Professional Examination (Part II) in the subjects of Veterinary Pathology, Bacteriology and Parasitology for the B.V.M. & S. degree:—

Aird, James G. S.; Bishop, Keith F. S.; Freer, Roger J.; Hislop, Christopher R. B.; Hodgson, Jackson; Jackson, Peter S.; Mews, Alastair R.; Morgan, John R. G.; Phororo, Daniel R.; Ridgeway, Andrew E.; and Rowntree, Philip G. M.

The undermentioned candidates have passed in the subject of Veterinary Pathology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Ferguson, Kenneth R. C.; Forgrave, Bryan T. G.; and Scott, Margaret A. B.

The undermentioned candidates have passed in the subject of Veterinary Bacteriology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Robertson, Harvey Y.; and Taylor, David R.

The undermentioned candidates have passed in the subject of Veterinary Parasitology of the Third Professional Examination (Part II) for the B.V.M. & S. degree:—

Doe, Ian; and Robertson, Harvey Y.

The undermentioned candidates have passed the Third Professional Examination (Part I) in Veterinary Pharmacology for the degree of Bachelor of Veterinary Medicine and Surgery:—

Jones, Alfred G.; Mews, Alastair R.; Robertson, Harvey Y.; Rowntree, Philip G. M.; and Scott, Margaret A. B.

The undermentioned candidates have passed the Third Professional Examination in the subjects of Veterinary Pharmacology and Veterinary Hygiene for the B.V.M. & S. degree:—

Barabas, Arpad Z.; Burney, John; Carnegie, David B.; Cran, Hugh R.; Dale, Stephen J.; Dobson, Keith B.; Eden, Donald T.; Gibbons, Robert W.; Gill, Anthony H.; Harding, Clifford; Henson, Peter M.; Le Page, Richard W. F.; Little, Thomas W. A.; Macdonald, William I.; Naish, Nicholas G.; Stewart, Anthony C.; Wilson, Alan J.; Windsor, Roger S.; Wray, Clifford; and Yelland, Patricia A.

The undermentioned candidates have passed in the subject of Veterinary Hygiene of the Third Professional Examination for the B.V.M. & S. degree:—

Horne, Ann M.; Strachan, Euan R.; Sutherland, Colin D.; Tretheway, John C.; and Veitch, Liana M.

The undermentioned candidates have passed Part II Examination for the Diploma in Tropical Veterinary Medicine:—

Branagan, Denis, M.R.C.V.S.; Dahab, Ahmed Mohamed, DIP.VET.SCI. (KHARTOUM); Down, Bryan Collett, M.R.C.V.S. (LONDON); Fraser, Charles Edward Ovid, B.V.SC., M.R.C.V.S. (LIVERPOOL); Ghoshal, Nani Gopal, G.V.SC. (CALCUTTA); Kagoda, James Henry, DIP.VET.SCI. (MAKERERE); Lawrence, John Alexander, B.SC., M.R.C.V.S.; Macfarlane, Iain Macinnes, M.R.C.V.S.; Richards, Benjamin Gurupathy, B.V.SC. (PUNJAB), M.R.C.V.S.; and Stoddard, Hannis Ledbetter Jr., B.SC., D.V.M. (TEXAS).

Liverpool

Graduation Ceremony

The University of Liverpool held three Graduation Ceremonies for the conferment of over a thousand degrees in the week ending July 1st, 1961, but the one of greatest interest to the profession was that held on Saturday, July 1st, at which two members of the profession received D.V.Sc's., one a Ph.D., three M.V.Sc's. and 21 the degree of B.V.Sc. The degrees were conferred by the Vice-Chancellor in the presence of a large assembly of staff and relatives.

In the afternoon, following on the graduation ceremony, the new graduates were formally admitted to membership of the Royal College of Veterinary Surgeons. This year the President was unable to be present in person at the ceremony, and this was conducted on his behalf by Professor J. G. Wright who gave a short address. As the President of the R.C.V.S. (Mr. L. Guy Anderson) was at the University during the previous week, when the results of the examinations were announced, he took the opportunity of addressing the successful students in anticipation of the admission ceremony.

After the admission ceremony, the new members, friends and staff were entertained to tea in the main hall of the new veterinary building.

Ordinary Degree of B.V.Sc.

Arnott, J. N.; Carding, A. H.; Carter, D.; Cotgreave, D. H.; Dunton, J.; Edwards, G. B.; Giam, C. H.; Harding, A. J.; Horrocks, Susan; Jones, R. M.; Kemble, P. R.; Kennington, D. A.; Littlewood, H. F.; Love-Jones, H.; Maclean, C. W.; Malone, J.; Strawbridge, G. E.; Thomson, Judith A.; Walker, D. E.; Weinberg, R.; Westbrook, R.; and Whittaker, J. F.

Passed Final Examination Part II only

Llewellyn, G.; and Williams, G. V.

Third Examination

PART I (PHARMACOLOGY)

Baskerville, A.; Bendefy, A. A.; Brinkler, J. L.; Cope, B. T.; Counter, D. E.; Dennison, Margaret; *Edington, N.; Flood, P. F.; *Furnevall, Elizabeth A.; Harper, F. D. W. Howard, Nina S. K.; Ishmael, J.; Jones, T. W.; McNaughton, J. R.; Markusfeld, O.; Malony, V.; Na'isa, B. K.; Finckheard, Ann; Thompson, J. D.; and *Udall, N. D.

* Passed with Distinction.

First Examination

PART I (CHEMISTRY)

Babbage, J. A.; Barker, Janice; Barnes, A. J.; Bode, R.; Bower, J. S. M.; Bowman, D. J.; Cooper, J. H.; Davidson, A. P.; Davies, Angela M.; Evans, D. A.; Evans, R. P.; Gittus, W. H.; Hacking, M. R.; Hall, G. A.; Hall, Judith A.; Hall, R. W.; Hoare, J.; Jenkins, G. M.; Longbottom, Sarah E.; Madconald, F. R.; Mason, Agnes C.; Middleton, A. L. V.; Mitchell, R. J. R.; Morris, H. T.; Pugh, K. E.; Reilly, P. E. B.; Salmon, R. D.; Sladin, N. D. H.; Smith, I. J.; Sullivan, K. A.; Tomusange, F. W.; Walters, R. J. W.; Whitwell, Katherine E.; and Woolley, D. M.

PART II (PHYSICS)

Babbage, J. A.; Barker, Janice; Barnes, A. J.; Bode, R.; Bower, J. S. M.; Cooper, J. H.; Davidson, A. P.; Dudley, B.; Evans, R. P.; Gittus, W. H.; Hacking, M. R.; Hall, G. A.; Hall, Judith A.; Hall, R. W.; Hoare, J.; Jenkins, G. M.; Longbottom, Sarah E.; Mason, Agnes C.; Middleton, A. L. V.; Mitchell, R. J. R.; Morris, H. T.; Pugh, K. E.; Reilly, P. E. B.; Salmon, R. D.; Sladin, N. D. H.; Smith, I. J.; Sullivan, K. A.; Tomusange, F. W.; Walters, R. J. W.; Whitwell, Katherine E.; and Woolley, D. M.

PART III (BOTANY)

Babbage, J. A.; Barker, Janice; Barnes, A. J.; Bode, R.; Bower, J. S. M.; Bowman, D. J.; Cooper, J. H.; Davidson, A. P.; Davies, Angela M.; Dudley, B.; Gittus, W. H.; Hacking, M. R.; Hall, G. A.; Hall, Judith A.; Hall, R. W.; Hoare, J.; Jenkins, G. M.; Longbottom, Sarah E.; Macdonald, F. R.; Mason, Agnes C.; Middleton, A. L. V.; Mitchell, R. J. R.; Morris, H. T.; Pugh, K. E.; Reilly, P. E. B.; Salmon, R. D.; Sladin, N. D. H.; Smith, I. J.; Sullivan, K. A.; Tomusange, F. W.; Walters, R. J. W.; Whitwell, Katherine E.; and Woolley, D. M.

The following higher degrees have been awarded. That of D.V.Sc. is conferred upon "graduates in veterinary science of not less than 8 years' standing who are adjudged to have distinguished themselves by their published contributions to veterinary science."

D.V.Sc. R. J. Garner, K. J. Hill.

M.V.Sc. F. A. Harrison, B.V.SC., B.SC., M.R.C.V.S., for his thesis *A Study of Bile Secretion in the Sheep*; J. F. Harbourne, B.V.SC., M.R.C.V.S., *The Epidemiology and Control of Fowl Typhoid*; and *M. J.* Edwards, B.V.SC. (SYDNEY), *A Study of Some Aspects of the Physiology and Pathology of Reproduction in the Cow.*

Ph.D. T. J. Forbes, B.AGR., DIP. AGR., *A Study of Some Aspects of Ovine Pregnancy Toxaemia.*

THE REGISTER OF VETERINARY SURGEONS

The undermentioned gentlemen were admitted to membership of the Royal College of Veterinary Surgeons on June 24th, 1961, in virtue of registrable degrees conferred on them by the University of Cambridge:—

Anderson, David Christie, M.A.VET.M.B., Thornton Manor, Moortown, Lincoln; Butt, Keith Martin, B.A.VET.M.B., 27, Glenroyd Gardens, Southbourne, Bournemouth, Hants.; Cromwell, Thomas Leonard Reade, M.A.VET.M.B., Border Hill, Dippenhall, nr. Farnham, Surrey; Halliwell, Richard Edward Winter, B.A.VET.M.B., Les Charrieres, St. Ouens, Jersey, Channel Islands; Henwood, John Keith, M.A.VET.M.B., 54, Holland Road, London, W.14; and Temple, James David, B.A.VET.M.B., 6a, Northcote Street, Devizes, Wiltshire.

The undermentioned ladies and gentlemen were admitted to membership of the Royal College of Veterinary Surgeons on July 1st, 1961, in virtue of the registrable degree of B.V.Sc. conferred on them by the University of Liverpool:—

Arnott, John Neil, "Weardale," 42, Ainderby Road, Romanby, Northallerton, Yorks; Carter, Derek, Oak Bank Farm, Marsh Lane, Dutton, Preston Brook, Warrington, Lancs; Cotgreave, David Harry, "Windygates," Dunham Hill, *via* Warrington, Lancs.; Dunton, John, 14, Empress Drive, Blackpool, Lancs.; Edwards, Gwilym Barrie, Post Office Flat, Rhos, nr. Wrexham, Denbighshire; Giam, Choo Hoo, 8, Elite Park Avenue, Singapore, 15; Harding, Anthony John, 88, Shrewbridge Road, Nantwich, Cheshire; Horrocks, Susan (Miss), "Sawrey," Turton, nr. Bolton, Lancs.; Jones, Hugh Love, Penlan, Llanfwrog, Ruthin, N. Wales; Jones, Richard Mervyn, Bryn Meirion, 7, Blackbrook Avenue, Hawarden, Chester; Kemble, Peter Robert, 32, Windsor Close, Beverley, E. Yorks; Kennington, David Albert, Manor House, Nocton, Lincoln, Lincs.; Littlewood, Hugh Frederick, "Homeleigh," Hatton Park, Bromyard, Herefordshire; Maclean, Colin William, "Colton," 77, Church Walks, Llandudno, N. Wales; Malone, Joseph, 112, St. Mary's Street, Warrington, Lancs.; Strawbridge, George Edmund, 85, Blenheim Road, Barnsley, Yorks; Thomson, Judith Ann (Miss), "Norcote," Old Town Lane, Formby, nr. Liverpool; Walker, David Earle, 49, St. Margaret's Road, Prestwich, Manchester; Weinberg, Roger, c/o Barclay's Bank D.C.O., Oceanic House, 1, Cockspur Street, London, S.W.1; Westbrook, Raoul, 23, Rectory Road, Crumpsall, Manchester, 8; and Whittaker, John Frederick, 181, Barden Lane, Burnley, Lancs.

The undermentioned gentlemen were admitted to membership of the Royal College of Veterinary Surgeons on July 3rd, 1961, and were registered in the Commonwealth List:—

Doyle, Bernard Joseph, B.V.SC. (SYDNEY), Graham Park, Berry, N.S.W., Australia; Lewis, Peter Bruce, B.V.SC. (SYDNEY), Department of Agriculture, Perth, Western Australia; Smith, Ian Donald, B.V.SC. (SYDNEY), Faculty of Veterinary Science, University of Queensland, St. Lucia, Brisbane, Queensland, Australia.

Removals from the Register

The undermentioned gentlemen were removed from the Register of Veterinary Surgeons under Section 25 (4) of the Veterinary Surgeons Act, 1948, and Veterinary Surgeons (Annual Fee) Order of Council, 1957:—

Abrams, Charles W.; Abdelbaki, Yahya Zakaria, De Villiers, Schalk Willem; Harper, Thomas; Kapur, Hans Raj; Leslie, Allan; O'Boyle, Henry; and Thompson, Alfred Lawrence.

Mrs. Joan Elizabeth Cavers, D.V.M. (TORONTO), 8, Menai View Terrace, Bangor, North Wales, was admitted to membership of the Royal College of Veterinary Surgeons on June 28th, 1961, and was registered in the Commonwealth List.

PERSONAL

Dr. W. I. M. McIntyre, senior lecturer in veterinary medicine at the University of Glasgow Veterinary School, has been appointed Professor of Veterinary Medicine in the School as from October 1st. While he is well known as a teacher and research worker his name will be particularly associated in the minds of the profession with the team who pioneered the use of X-irradiated larvae as an immunising agent.

Mr. Vincent Trought of Rochester has been awarded the O.B.E. for gallantry during the Devon floods last September, when he rescued two women, and helped in the rescue of a third, who were cut off. He carried one of the women on his back for 200 yards through the flood water.

Engagement

CLIFFORD—CRUNDALL.—The engagement is announced between Hugh Richard Clifford, M.B.E., M.A., M.R.C.V.S., H.M. Overseas Veterinary Service, Uganda, younger son of the late Maurice William Clifford and of Mrs. Hilda Marian Clifford of Beaford House, Nr. Winkley, North Devon, and Anne Margaret Crundall of Vine Cottage, Boxted, Essex, elder daughter of the late Lt./Cmdr. and Mrs. Alexander Crundall.

Births

FISHWICK.—On June 20th, 1961, to Cynthia, wife of Roy Fishwick, M.R.C.V.S., at Saxmundham, a son, John Charles, a brother for Peter, Susan and William.

HILL.—On June 25th, 1961, to Valerie (*née* Manning), wife of Graham Hill, BS.VET.MED., MS.R.C.V.S., Blank House, Wymondham, Norfolk, a son, Simon Graham.

PETERS.—On May 31st, 1961, to Pamela, wife of John Peters, M.R.C.V.S., at 57, College Road, Framlingham, a son, Richard Suttle, brother for Mark and James.

WINTERSON.—On July 1st, 1961, to Ann, wife of P. Winterson (Administrative Assistant to the Registrar, R.C.V.S.), of 6, Bath Road, Chiswick, W.4, a daughter, Lucy.

COMING EVENTS

July

11th (Tues.). WEST WALES VETERINARY CLUB. Meeting at the Golden Lion Hotel, Carmarthen, 7.30 p.m. for 8 p.m.

11th and 12th (Tues. and Wed.). BRITISH VETERINARY POULTRY ASSOCIATION. Summer Meeting. Please see Notice in this issue.

12th (Wed.). B.S.A.V.A. (MIDLAND REGION). Meeting at the Randolph Hotel, Oxford, 8.15 p.m.

13th (Thurs.). B.S.A.V.A. (SUSSEX REGION). Meeting at the Ciba Laboratories, Horsham, 8.30 p.m.

14th (Fri.). ZOOLOGICAL SOCIETY OF LONDON. Meeting of veterinary surgeons interested in the treatment of captive wild animals and exotic pets at the Main Offices, Zoological Society of London, Regent's Park, London, N.W.1, 10 a.m.

A.V.T. & R.W. (SOUTHERN REGION). 18th Ordinary Meeting at the University of Cambridge, School of Veterinary Medicine, 12 noon.

YORKSHIRE VETERINARY SOCIETY. Meeting at the Parkway Hotel, Bramhope, Leeds, 2.30 p.m.

15th (Sat.). B.S.A.V.A. (SOUTHERN COUNTIES). Meeting at the Grange, Osborn Road, Fareham, Hants, 7.30 p.m.

19th (Wed.). EASTERN COUNTIES VETERINARY SOCIETY. Annual General and Summer Meeting at the Duke's Head Hotel, Tuesday Market Place, King's Lynn, Norfolk, 11 a.m.

21st (Fri.). R.A.V.C. DIVISION. Meeting at the Balmer Lawn Hotel, Brockenhurst, Hants., 11 a.m.

24th (Mon.) CENTRAL VETERINARY SOCIETY. Visit to the Post-graduate Medical School, Hammersmith, 2.30 p.m.

September

2nd (Sat.). STREATLEY '58 CLUB REUNION. Annual Dinner at "Ye Miller of Mansfield."

3rd to 9th (Sun. to Sat.). 79th Annual Congress and Exhibitions of the British Veterinary Association at Oxford

7th (Thurs.). ROYAL VETERINARY COLLEGE ASSOCIATION. Annual Dinner during the B.V.A. Congress at St. Edmund's Hall, Oxford.

QUARTERLY MEETINGS OF COUNCIL AND STANDING COMMITTEES

Tuesday, July 18th, 1961

5 p.m. Finance Sub-committee.

Wednesday, July 19th, 1961

10.30 a.m. Farm Livestock Committee.

12 noon. Parliamentary and Public Relations Committee.

2.15 p.m. Veterinary State Medicine Committee.

4 p.m. Home Appointments Committee.

Thursday, July 20th, 1961

10.30 a.m. Small Animals Committee.

2.15 p.m. General Purposes and Finance Committee.

(All the above will be held at 7, Mansfield Street.)

Friday, July 21st, 1961

10.15 a.m. Council. (Connaught Rooms, Great Queen Street.)

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the date on which disease has been confirmed, followed by the postal address and local authority.

Anthrax

June 27th, 1961. M. Rolf-Silvester, Reaphay Farm, West Buckland, Wellington, Somerset (Parish: Trull). SOMERSET.

June 27th, 1961. A. G. Forsey, Bonny Green Farm, Winsham, Chard, Somerset (Parish: Thorncombe). DORSET.

June 28th, 1961. W. F. Hosegood, Eames Mill Dairy, Ashwell Farm, Ashwell, Ilminster, Somerset (Parish: Ilminster). SOMERSET.

June 29th, 1961. S. Dyer, Crawley Farm, Yarcombe, Honiton, Devon (Parish: Membury). DEVON.

June 30th, 1961. B. V. Studley, Home Farm, Racedown, Beaminster, Dorset (Parish: Broadwindsor). DORSET.

July 3rd, 1961. E. J. Collins, Joyden Farm, Forton Road, Chard, Somerset (Parish: Chard). SOMERSET.

July 3rd, 1961. W. Parris, Aller Farm, Up Ottery, Honiton, Devon (Parish: Up Ottery). DEVON.

Fowl Pest

June 27th, 1961. Mrs. E. Osborne, Brick Kiln Cottage, Carlton, Saxmundham, Suffolk. EAST SUFFOLK.

June 27th, 1961. H. Threlfall, Pickup Street, Clayton-le-Moors, Accrington, Lancashire. Disease at: Pickup Street Allotments, Clayton-le-Moors, Accrington, Lancashire. LANCASHIRE.

June 27th, 1961. Dr. G. M. Anderson, Blacket House, Eaglesfield, Lockerbie, Dumfriesshire. DUMFRIESSHIRE.

June 27th, 1961. Messrs. D. Last and Son, The Mill, Sibton, Saxmundham, Suffolk. EAST SUFFOLK.

June 27th, 1961. H. G. Allum, Park Dale, Eye, Suffolk. EAST SUFFOLK.

June 28th, 1961. W. Paterson, Newlands, Eaglesfield, Lockerbie, Dumfriesshire. DUMFRIESSHIRE.

June 29th, 1961. A. R. Smith, Sydling, Wayside Road, St. Leonards, Ringwood, Hampshire. HAMPSHIRE.

June 30th, 1961. J. Graham, Holmlea, Eaglesfield, Lockerbie, Dumfriesshire. DUMFRIESSHIRE.

June 30th, 1961. E. Naylor, Crook Height Farm, Bury Lane, Withnell, Chorley, Lancs. LANCASHIRE.

July 1st, 1961. M. P. Elsey, Montreal Cottage, Magdalen Street, Eye, Suffolk. EAST SUFFOLK.

July 2nd, 1961. T. A. Oakes, Station House, Eye, Suffolk. Disease at: Premises at Station Yard, Magdalen Street, and rear of Three Horse Shoes, Eye, Suffolk. EAST SUFFOLK.

July 2nd, 1961. J. Wesley, Hyndside, Hynde Barn Road, Great Harwood, Blackburn, Lancs. LANCASHIRE.

July 2nd, 1961. H. Waters, Pauls Grove Farm, Great Glemham, Saxmundham, Suffolk. EAST SUFFOLK.

July 3rd, 1961. T. E. Lewis, Pinehurst, Grange Road, St. Leonards, Ringwood, Hants. HAMPSHIRE.

July 3rd, 1961. H. R. E. Ruddock, Magdalen Street, Eye, Suffolk. Disease at Cemetery Allotments, Eye, Suffolk. EAST SUFFOLK.

Swine Fever

June 27th, 1961. T. Harrison, Chatt House, Burton Pidsea, Hull, Yorks. Disease at: Elm Tree Farm, Burton Pidsea, Hull, Yorks. YORK, EAST RIDING.

June 27th, 1961. D. W. Chapman, Bainessi Farm, Catterick, Richmond, Yorks. Disease at: Bridge Farm, Catterick, Richmond, Yorks. YORK, NORTH RIDING.

June 27th, 1961. D. H. Brennand, Middenstead Farm, Hoghton, Preston, Lancs. LANCASHIRE.

June 27th, 1961. J. Bridge, Rhos Ucha, Ffrith, Wrexham, Denbighshire. FLINTSHIRE.

June 27th, 1961. J. Collinson, Gift Hall Farm, Winmarleigh, Preston, Lancs. LANCASHIRE.

June 27th, 1961. Abattoir, Metropolitan Cattle Market.

Islington, London, N.7 (Premises of origin not known). LONDON.
June 28th, 1961. F. Barwick, Old Post Office Farm, Hutton, Weston-super-Mare, Somerset. Disease at: Old Post Office Farm and Court Buildings, Hutton, Weston-super-Mare, Somerset. SOMERSET.
June 28th, 1961. F. C. Sherratt, Brook Farm, Chorley, Lichfield, Staffs. STAFFORDSHIRE.
June 28th, 1961. T. Turner, Oak Lane, Calf Heath, Shareshill, Wolverhampton, Staffs. STAFFORDSHIRE.
June 28th, 1961. J. B. Bleasdale, Hob Stones Farm, Colne, Lancs. LANCASHIRE.
June 28th, 1961. T. Bell, Marsh Lane Farm, Holmes Chapel, Crewe, Cheshire. CHESHIRE.
June 29th, 1961. G. Knox, East Farm, Stillington, Stockton-on-Tees, Durham. DURHAM.
June 29th, 1961. W. F. Pulford, Elm Farm, Ledsham, Little Sutton, Wirral, Cheshire. CHESHIRE.
June 29th, 1961. F. R. Chatwin, Bricklyn Farm, Bulls Lane, Wishaw, Sutton Coldfield, Warwickshire. WARWICKSHIRE.
June 30th, 1961. J. W. & E. Brown, West End Farm, South Cave, Brough, Yorks. Disease at: Robert Crispins premises, West End, South Cave. YORK, EAST RIDING.
June 30th, 1961. H. Bibby, Quarry Farm, Hasbury, Halesowen, Birmingham. WORCESTERSHIRE.
July 3rd, 1961. S. N. Boulton, 1137, Hessle Road, Hull, Yorks. Disease at: rear of 99, Boothferry Road, Hessle, Yorks. YORK, EAST RIDING.
July 3rd, 1961. Handley Bros., Bretton Farm, Bretton, Chester. FLINTSHIRE.
July 3rd, 1961. W. Jones, Blaenau Ucha, Froncysyllte, Wrexham, Denbighs. DENBIGHSHIRE.
July 3rd, 1961. C. Remnant, Greenmeadow Farm, Llanellen, Abergavenny, Mon. MONMOUTHSHIRE.
July 3rd, 1961. H. Tarn, Middle Lane, Melsonby, Richmond, Yorks. YORK, NORTH RIDING.
July 3rd, 1961. C. Threapleton, Rock Ridge Farm, Rock Lane, Bramley, Leeds, 13. CITY OF LEEDS.
July 3rd, 1961. H. Roe, 24, Kingsway, Thurnscoe, Doncaster, Yorks. Disease at: 3, 11, 26, Togo Allotments, Thurnscoe, Doncaster, Yorks. YORK, WEST RIDING.
July 3rd, 1961. M. R. Edwards, Hillside, Coreley, Ludlow, Salop. SHROPSHIRE.
July 3rd, 1961. C. L. Butler, High House Farm, Staining, Blackpool, Lancs. COUNTY BOROUGH OF BLACKPOOL.
July 3rd, 1961. S. Balaam, Meadow Bungalow, Sapiston, Bury St. Edmunds, Suffolk. WEST SUFFOLK.
July 3rd, 1961. E. W. Grieves, Oakdene, Whinney Hill, Stockton-on-Tees, Co. Durham. COUNTY DURHAM.
July 3rd, 1961. I. Walker, Mountain Ash, Long Newton, Stockton-on-Tees, Co. Durham. COUNTY DURHAM.
July 3rd, 1961. E. Knaggs, Bettys Farm, Elton Lane, Elton, Stockton-on-Tees, Co. Durham. COUNTY DURHAM.
July 3rd, 1961. B. F. Prout & Son Ltd., Lower Silver Street Farm, Coaley, Dursley, Glos. GLOUCESTERSHIRE.
July 3rd, 1961. Mrs. G. L. Hodgson & Sons, The Grange, Summerhouse, Darlington, Co. Durham. COUNTY DURHAM.
July 3rd, 1961. M. Wilson, Town End Farm, Gilling West, Richmond, Yorks. YORK, NORTH RIDING.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th June, 1961		6	—	1	24	—	61
Corresponding period in	1960	3	—	—	32	—	72
	1959	10	—	1	47	—	70
	1958	6	—	—	16	—	102
1st January to 15th June, 1961		99	—	102	600	—	549
Corresponding period in	1960	120	—	14	1,299	—	539
	1959	122	—	9	399	—	553
	1958	87	3	111	301	—	588

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

The Pied Piper: Fact or Fiction ?

Sir,—I was recently in the company of some farmers, two of whom claimed to have seen rat migrations, one of them twice. The first described a column of rats several yards wide, which took about half an hour to cross the main Preston-Blackpool road, going in the direction of the River Ribble a year or two before the Second World War. He spoke of an eerie chirruping and whistling noise made by the rats as they marched along.

The other farmer's experience was even more noteworthy. He and two friends, with two lurchers, set off one moonlit night to chase rats from under hen cabins. In the farm-yard they noticed that there seemed to be some unusual activity amongst the rats; but when they turned to set the dogs on them, the dogs had disappeared. They were astounded at this until they, too, heard the strange whistling and chirruping noise. This grew louder, and they eventually saw the head of a column of rats advancing into the farm-yard. The noise now reached a crescendo and, as the column advanced across the yard, rats, seemingly attracted by the sound, rushed in scores from all the buildings and joined the column. The three observers scared stiff, stood stock still and the rats ran between and over

their feet, taking 15 to 20 minutes to pass. Not one rat was seen or caught at that farm again for over 6 months.

Is it not conceivable that a man with a highly perceptive ear and a knowledge of wind instruments could construct a pipe which would duplicate the noise of a rat migration? Is it not also probable that, if one were in the right place at the right time with a portable tape recorder, one could capture this strange call which seemingly no rat can ignore. Might not this then be effective, in places with a large rat population, in luring the majority of them to their doom?

I am curious to know the opinions of your readers on these points. Perhaps some may have had first-hand experience of this phenomenon?

Yours faithfully,
W. J. TARVER.

39, Beech Grove,
Ashton-on-Ribble,
Preston,
Lancs.
June 27th, 1961.

Mr. Robert Coulthard

Sir,—The news of the death of Robert Coulthard on May 13th which has just reached me on June 28th, when reading the appreciation by R. S. Marshall in your issue of May 27th, is no less a shock to another old timer, by virtue of the interim that has elapsed.

His long service in Nigeria, during more than half of which I was in close association with him, was marked by his obstinate refusal to be translated from the responsibilities of the field to those of the administration, and the delight of his organisation which permitted him to move at a moment's notice without complaint.

Indeed, I remember well on his reporting to headquarters on one occasion after an overseas leave regarding his posting, he accurately named this although in fact, my mind had only just been made up from several choices, and on being asked how he knew, he said, "Well, it's the only field posting which I have not yet occupied." This apparently peripatetic existence did not reflect a square peg in a round hole, but rather the type of man who could be relied on to make a success of the difficult jobs.

His complete integration with the life of a Northern Nigerian *élite* was only matched by his immaculate turn-out and way of life of a British gentleman when on overseas leave. Robert was of the stuff of which the British Empire was made.

Yours faithfully,
W. G. BEATON.

Interafrican Bureau, for Animal Health,
Muguga,
P.O. Kikuyu,
Kenya.
June 29th, 1961.

Mastitis and Milking Machines

Sir,—In his article "The physical principles of the milking machine" (*Vet. Rec.* **73**. 600), Mr. Maffey states that we deny the association between machine milking and mastitis. To support this statement a reference is given, page 136, of H.M.S.O. Bulletin 177, which was written by one of us (F.K.N.). Nowhere in this reference or elsewhere is there any statement by us denying the association between machines and mastitis. In fact on the page referred to and on the following page, it is stated quite clearly that the design of the machine can influence both streptococcus and staphylococcus mastitis, that machine milking is responsible for teat erosion and that the type of teat-cup liner is definitely a factor in mastitis.

What we do deny is that there is convincing evidence that mastitis outbreaks can be prevented solely by the careful use of the milking machine using the methods described by Mr. Maffey on pages 599 and 600 of his article. The information gained from advisory visits is extremely difficult to interpret and published analyses of these visits which incriminate milking methods are not convincing.

Because of the importance of the disease and the publicity that is being given to what is not yet a proved method of control we feel that a fully organised field trial of the techniques should be carried out.

Yours faithfully,
F. K. NEAVE,
F. H. DODD.

The National Institute for Research in Dairying,
Shinfield,
Reading.
June 28th, 1961.

Prolapse of the Uterus in the Bitch

Sir,—The clinical note on uterine prolapse in the bitch by McCaig in the last issue of THE RECORD, prompts me to record a similar case. The animal was a primaparous Beagle bitch, to which I was summoned at 2 a.m., as she had been straining for 2 hours without observable result. Upon arrival I was informed that a large pup had been born about 5 minutes previously, but that the bitch was haemorrhaging badly.

Quite a pool of blood was present on the floor of the whelping box and the hindquarters of the bitch were liberally blood-smeared. Careful cleansing and examination of the vulval area showed that a prolapse of one uterine cornu had occurred, exposing the maternal placental area which was bleeding profusely. The bleeding surface was sprayed with a 1:1,000 solution of adrenaline and the prolapsed cornu gently returned to the abdomen. This procedure was facilitated by raising the hindquarters of the bitch and by manipulation of the cornu by the left hand through the abdominal wall. The bitch showed no sign of resentment or even discomfort at this treatment. Haemorrhage was still considerable so 10 units of posterior pituitary extract were injected intramuscularly and the pup was allowed to suckle to encourage contraction of the uterus. Haemorrhage gradually subsided during the succeeding 20 minutes and the bitch was given antibiotic cover by the injection of 300,000 units each of benzathine penicillin and procaine penicillin* and slightly

sedated by the intramuscular injection of 25 mg. of chlorpromazine hydrochloride†. Recovery was uneventful.

McCaig suggests that the prolapse in his case may have been due to decrease in muscle tone due to lack of exercise and large puppies. In the case described above the bitch was in hard physical condition and although the single pup was rather large, I think the main cause was the bitch's failure to part the umbilical cord, with the result that tension was exerted upon the incompletely separated placenta and this actually turned the cornu inside out. The poor placental separation was also the cause of the profuse haemorrhage.

Yours faithfully,
G. T. WILKINSON.

Orford Place,
Norwich,
Nor 11D.
June 26th, 1961.

* Penidural Fortified (Wyeth).
† Largactil (May & Baker).

Prolapse of the Uterus in the Bitch and the Cat

Sir,—I was very interested to read the recent article on a case of prolapse of the uterus in the bitch (McCaig, 1961). I have recently been called to a similar case in the bitch, and also one in the cat.

The condition in the bitch occurred in an 18-month-old Border Welsh Collie, pregnant for the first time. Three of the puppies were born dead, but were to term. I was not called to examine the bitch until 24 hours after whelping when it appeared that the prolapse had not long occurred.

The bitch was in poor condition, yet active and alert. The uterus had only partly prolapsed; there being a 5 in. Y-shaped organ, involving uterine body and cornu, protruding from the vulva. The organ was not enlarged nor heamorrhagic and was afforded protection by the animal's long hair.

The replacement of the prolapse was almost identical to the method described by McCaig, except that it was found unnecessary to use a general anaesthetic. The use of a long glass test tube was found most helpful to complete the reduction.

After treatment consisted of 1,250,000 units of a mixture of crystalline procaine and benethamine penicillin injected intramuscularly.

On the third day the bitch was playful and the temperature normal, but she was not eating. There was considerable vaginal irritation and a mucopurulent discharge. By the fourth day the temperature had risen to 104.2°F., and the discharge was now copious. This was treated with crystalline and procaine penicillin and dihydrostreptomycin sulphate and responded satisfactorily in 48 hours. An injection of 4cc. of a vitamin B complex* was also administered There was now considerable improvement in the general condition of the bitch, and she was eating ravenously, but there was still a persistent vulval irritation causing her considerable discomfort. This appeared to be mostly due to oedema of the vulva which responded to 25 mg. hydrochlorothiazide† intramuscularly followed by daily doses of 25 mg. *per os*.

The second case occurred in a 2-year-old queen having just had her third litter. The 2 previous litters were produced normally. The owner had noticed something protruding soon after the kittening, but had not sought professional advice for 24 hours. By then the animal was severely shocked. The prolapse was complete in this case, and grossly enlarged and engorged.

The only logical method of treatment was one of amputation, which was performed under light pentobarbitone sodium anaesthesia. After the usual surgical preparation of the site, an incision was made into the anterior part of the uterine body as close as possible to the vulva. The distal ends of the uterine horns could now be clearly seen, and by applying gentle traction a ligature was tied above one of the ovaries. The other could not be brought into sight, so the ligature was applied beneath it. Amputation was completed by incising through the uterine body. It was finally closed with interrupted catgut sutures and the stump reduced through the vulva.

After treatment consisted of 300,000 units of crystalline penicillin daily for 4 days. There was an amazing recovery 24 hours post-operatively, and in 48 hours the animal was eating and drinking well. Subsequent recovery was uneventful.

I feel the case of the bitch is an interesting one, for the prolapse occurred several hours after whelping. Unfortunately the owner had disposed of the puppies, but they were certainly to term, and were apparently quite large. As suggested by McCaig this may well have caused excessive straining with a loss of muscular tone. This certainly did not result from lack of exercise in this particular case.

The condition of the cat occurred within an hour or two of kittening, and unlike that in the bitch, quickly produced a deterioration in the animal's condition. As prolapse of the uterus is rare in both the bitch and the queen, might it not be that there is a weakness in the uterine ligaments in these sporadic cases? In those few cases that do occur there must basically be a loss of muscle tone.

Benesch and Wright (1947) report the condition to be rare in the bitch, and mention that replacement of the everted cornu is generally impossible and that amputation is indicated. This would appear to apply to the cat, but there are reservations as far as the condition in the bitch is concerned.

Yours faithfully,
M. A. H. NEWMAN.

Darley House,
Marlborough Road,
Buxton,
Derbys.
June 26th, 1961.

References

McCaig, J. (1961). *Vet. Rec.* **73**. 628.
Benesch, F., & Wright, J. G. (1947). "Veterinary Obstetrics." 3rd ed. Baillière, Tindall & Cox, London.

* Parentrovite, Vitamins Ltd.

† Vetidrex, Ciba.

Future of Animal Husbandry in Overseas Territories

Sir,—After reading Dr. Polding's conrtibution to this correspondence I might concede that my letter of April 8th was written on the crest of a wave of disillusion. Having witnessed the growth of the University College of the West Indies and the tremendous impact this had on social and academic progress and, indeed, on the whole fabric of middle class life in Jamaica, I fully appreciate Dr. Polding's assessment of the real value which ought to arise from a local university here in East Africa. My concern is that here, once again, it is a case of "too little and too late" and that, particularly with regard to veterinary matters, the opportunity of creating a veterinary school of acceptable standards and international repute in East Africa has already passed. Even if such standards were now achieved I believe it is doubtful if the academic tradition could be made sufficiently strong to maintain it.

If, as Dr. Polding trusts, the desired standards can be achieved and maintained in East Africa, this in no way lessens the need for a course at a high standard within the United Kingdom in tropical veterinary medicine.

Yours faithfully,
R. M. ARNOLD.
Chief Veterinary Research Officer.

Ministry of Agriculture,
Department of Veterinary Services,
P.O. Box 9152,
Dar Es Salaam,
Tanganyika.
June 29th, 1961.

Downing's Instructions for the Extracting of Calves

Sir,—May I briefly comment on Mr. Hall's article on Downing which appeared in THE VETERINARY RECORD of July 1st?

Whilst it may be true that, at the time to which Mr. Hall refers, "the treatment of cattle was shunned by the profession and relegated to cow leeches," the statement that few books were devoted entirely to the diseases and treatment of cattle cannot go unchallenged. James White, in his preface to the thirteenth edition of "A Compendium of The Veterinary Art," dated 1822 wrote:—

"About this time appeared a book by Downing, and another by Topham, on the diseases of cattle. Clater's 'Every Man his own Farrier' had been published some years before; and about this period appeared his volume 'on the Diseases of Cattle.' A quarto book on cattle medicine was published soon after by Mr. Skerrett (sic), which contained some good representations of the calf *in utero*, and some useful observations on the subject. But one of the best books that have ever appeared on cattle medicine was by Mr. John Lawrence."

Drawing a modern parallel, one might ask how many books devoted entirely to cattle diseases have been published in Great Britain within the last 10 years?

Thomas Brown, in his "Manual of Modern Farriery" (published about 1851), describes Downing as "a veterinary surgeon who had much experience," and goes on to give a lengthy summary of his "seven different preternatural positions."

Here then, we have 2 authors, one writing more than 50 years after the original publication of Downing's book, who make reference to him, one in some detail. It would, therefore, seem that Downing was not forgotten in the 19th century, even if he may be to-day.

Mr. Hall is to be congratulated on bringing to our attention a somewhat neglected subject and it is indeed a sobering experience to read the works of earlier members of our profession, whose clinical evaluation of a patient depended almost entirely on their own powers of observation, uassisted by the sort of clinical aid available to us to-day.

Yours faithfully,
H. E .CARTER.

36 St. George's Road,
Enfield,
Middlesex.
July 3rd, 1961.

Enteritis in Rabbits

Sir,—Your recent announcement in THE VETERINARY RECORD that the B.V.A. is anxious to accumulate all available information on rabbit diseases is most welcome because of the dearth of published material on this subject.

In the interim, before this information becomes available to us, I wonder if anyone knows the answer to the following form of enteritis in rabbits. Typically, it occurs in the 5 to 7 week age group, although symptom. American authors refer to it as " mucoid nature with a form of bloat appears to be the main symptoms. American authors refer to it as "mucoid enteritis."

I have tried to prevent the condition by treating ah the young rabbits with sub-therapeutic doses of oxytetracycline hydrochloride (Terramycin) by mouth. This has checked the condition to some extent, but many have broken down, death occurring in a few hours. Treatment with the same antibiotic does not appear to be very effective either. Personally, I believe the main predisposing cause to be nutritional or environmental.

Yours faithfully,
PETER H. McCREADY.

31, Cardiff Road,
Luton,
Beds.
June 27th, 1961.

The Reform of Veterinary Education

Sir,—Mr. R. Merlen feels very strongly about this matter as he has written in similar vein before. It is right and proper that he should take seriously the education of students, because he is a teacher. The student is unable to judge what is and what is not important, so it is for the teacher to take a middle course, and what is essential, to relate his teaching to the world outside the cloisters of the university in which the new graduate will have to earn his living.

Now research workers do not necessarily make good teachers. For a research man to progress in the discipline of his choice, his work tends to become increasingly intricate and minute details assume great importance, until there may come a time when he is obsessed with his subject. To be kind, this means he is enthusiastic; to be cruel, that he has become narrow-minded. His ability and enthusiasm may fog the real issue which should be to impart basic information and so allow the student to relate the part to the whole. The final product (i.e. the veterinary surgeon) with a balanced outlook is the object of the exercise.

One root trouble with regard to teaching is that veterinary science lies between medicine and agriculture and there is little in common with a surgical operation on the eye of a cat and the economics of agriculture, plus the subsidies, trade unions, and the history of primitive nomads, as suggested for study by Mr. Merlen. Not that his proposals are unimportant, but would they not enlarge an already crowded course? Does not the student acquire this sort of information by reading the weekly farming journals and discussing such matters when seeing practice?

Very few would dare to recommend a return to the 4-year course, but a comparison of that curriculum with the 5-year course might indicate where the scissors can be used. It is not generally recognised that whilst one is *taught* a great deal as a student, *knowledge* is only acquired after graduation. I agree with Mr. Merlen that there seems to be an attempt on the part of some teachers to give a specialised rather than a generalised course. I am not in a position to draw attention to any particular discipline, but refer to this matter in general terms only.

Whether the R.C.V.S. likes it or not, it must be recognised that we live in an era of specialisation, but the time for specialised study and practice is *after* graduation. Now we have only 2 post-graduate diplomas; the D.V.S.M. and D.T.V.M. I suggest that the R.C.V.S. should consider post-graduate diplomas in (a) surgery, (b) medicine and (c) pathology. Whether by these means it would be possible to cut the students' courses of training is debatable, but at least it would allow the opportunity to study and practice in greater detail than is required for ordinary graduation. If there is, in fact, a case for trimming the students' course, I do suggest that the colleges enlist the views of different sections of the profession, and I submit that those of us who are interested in veterinary science and practice in its broadest sense would co-operate willingly.

In the last quarter of a century, the profession has made progress and I think it is fair that the teaching schools should take some credit for that, so whilst it may be as well to reform some aspects of veterinary education, we do not want any more duplication than exists already between the agricultural and veterinary colleges. Veterinary science and agriculture have got to meet somewhere and the point at which one begins and the other ends has always been difficult to determine. In developing countries much animosity has arisen on the respective importance of veterinary science, *vis-à-vis* animal husbandry, and there is a tendency to look upon the veterinarian as somebody who treats only the individual sick animal whereas the problems involved are often of national or international importance. It is these latter which seem to trouble Mr. Merlen, but we should not lose sight of the fact that the vast majority of the profession are in practice.

In conclusion, let consideration be given to cutting out unimportant details in the students' course and offering (for a start) the post-graduate diplomas suggested.

Yours faithfully,
RUFUS S. T. BOWDEN.

Animal Health Trust,
Canine Health Centre,
Kennett,
Nr. Newmarket,
Suffolk.
July 3rd, 1961.

Sir,—Although I am not a veterinary surgeon, I have always regarded the veterinary profession as a learned one, and my many dealings with veterinary surgeons in the course of my work have done nothing to disillusion me. But now I learn from Mr. Rene Merlen's letter (June 17th) that veterinary surgeons should not practise medicine and the promotion of health in animals based on sound scientific education, but rather should be experts in rural political economy.

This, it seems, is to be regarded as true university education, better than a scientific interest in the health of animals and the desire to relieve their sufferings. I had always thought the latter was the real veterinary vocation, comparable with that of the medical profession to which I belong.

Will someone please help me to retain my illusions of the veterinary profession, and my honest respect for so many members of it whom I count among my friends and colleagues?

Yours faithfully,
W. LANE-PETTER.

Laboratory Animals Centre,
M.R.C. Laboratories,
Woodmansterne Road,
Carshalton,
Surrey.
July 4th, 1961.

Scientists in Tropical Africa

Sir,—I was intrigued the other day, when reading through a French publication, to see that East African swine fever was referred to as "La Maladie de Montgomery." It would seem that the French remember our scientists who worked in tropical Africa rather better than ourselves.

Yours faithfully,
J. CARMICHAEL.

Boarded Barns Farm,
Ongar,
Essex.
June 27th, 1961.